US Army Corps
of Engineers
Seattle District

Public Notice

Proposal for a Mitigation Bank

Regulatory Branch
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Telephone (206) 764-3495
ATTN: David J. Martin, Project Manager

Public Notice Date: 10 May 2004
Expiration Date: 9 June 2004
Reference No.: 200300879
Name: Skykomish Habitat, LLC

The U.S. Army Corps of Engineers (Corps) herby notifies interested parties of an opportunity to comment on a proposal to construct and operate a mitigation bank in Snohomish County, Washington. Construction of the 239-acre (ac) Skykomish Habitat Mitigation Bank (SHMB) would require Department of the Army authorization pursuant to the requirements of Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899.

APPLICANT – Skykomish Habitat, LLC
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Snohomish, WA 98290
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AGENT – Environmental Restoration, LLC
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LOCATION – The proposed SHMB would be constructed along the north bank of the Skykomish River approximately 2.5 miles upstream of its confluence with the Snohomish and Snoqualmie Rivers, near Monroe, in Snohomish County, Washington. The bank site is located in Sections 11 and 14, Township 27 North, Range 6 East on the Monroe, Washington USGS quadrangle map; in Water Resource Inventory Area 7 (Snohomish River Watershed); and in USGS Hydrologic Unit 17110009 (Skykomish).

WORK – Skykomish Habitat, LLC (proponent), proposes to construct and operate a 239-ac mitigation bank on a 260-ac site located along the north bank of the Skykomish River between River Miles 1.8 and 3.0. The site, which is partially protected from overbank flooding by a county-owned levee, is currently used for agricultural, recreational, residential, and other purposes.

Currently, the SHMB site is comprised of approximately 3 ac of stream channel, 23 ac of forested riparian zone, 21 ac of forested and emergent wetland, and 192 ac of “non-functioning” areas such as agricultural land, a residence compound, ball fields, and a dirt bike track. Development of the SHMB would end the current detrimental land uses and result in a permanently protected site comprised of approximately 46 ac of braided side channels connected to the Skykomish River, 50 ac of forested riparian zone, 129 ac of wetland, and 14 ac of enhanced upland. The existing levee may be modified to further normalize flood flow in the river channel, including over the mitigation bank site. The entire 260-acre bank site would be protected in perpetuity by conservation easement. A detailed description of the implementation plan can be found in the attached, *Prospectus for the Skykomish Habitat Mitigation Bank, Monroe, Snohomish County, Washington*, dated April 15, 2004.

PURPOSE – The purpose of the SHMB is to provide for sale to the general public high-quality, consolidated, off-site compensatory mitigation for a variety of adverse aquatic ecosystem impacts associated with activities authorized by the Corps and other regulatory entities within the service area of the bank.

ADDITIONAL INFORMATION – The proponent is working with a mitigation bank review team (MBRT) to develop a mitigation banking instrument (MBI) in accordance with *Federal Guidance for the Establishment, Use and Operation of Mitigation Banks* (60 FR 58605-58614, November 28, 1995), the U.S. Department of Interior's *Guidance for the Establishment, Use and Operation of Conservation Banks*, dated May 2, 2003, and applicable state, local, and other federal requirements. An MBI details the legal and physical characteristics of a mitigation bank and describes how the bank would be established, operated, and protected in perpetuity.

Construction of the SHMB would involve the discharge of dredged and fill material into waters of the United States, which requires Department of the Army authorization under Section 404 of the Clean Water Act. The proposed project would also involve work in or affecting navigable waters of the United States, which requires Department of the Army authorization under Section 10 of the Rivers and Harbors Act of 1899. Based on a preliminary evaluation of this proposal by the Corps, it appears that the proposed bank may be authorized by Nationwide Permit 27, which authorizes qualifying wetland and riparian restoration and creation activities.

ENDANGERED SPECIES – Pursuant to the requirements of the Endangered Species Act of 1973 (ESA), the Corps must assess the potential impacts of its actions on species listed, or proposed for listing, as threatened or endangered under the ESA. The bald eagle (*Haliaeetus leucocephalus*), threatened; Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*), threatened; and Coastal/Puget Sound bull trout (*Salvelinus confluentus*), threatened are known to occur in the vicinity of the project area. Upon receiving comments in response to this public notice, the Corps will evaluate the potential impact of the proposed action on these species and any designated critical habitat for federally listed species.

ESSENTIAL FISH HABITAT – The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996, requires Federal agencies to consult with the National Marine Fisheries Service (NMFS) on all actions, or proposed actions, permitted, funded, or undertaken by the agency that may adversely affect essential fish habitat (EFH). The Corps has determined that EFH for Pacific salmon occurs in the action area. Upon receiving comments in response to this public notice, the Corps will evaluate the potential impact of the proposed action on EFH for federally-managed fisheries in Washington waters. The Corps' final determination relative to project impacts and the need for mitigation measures is subject to review by, and coordination with, the NMFS.

CULTURAL RESOURCES – The District Engineer has reviewed the latest published version of the National Register of Historic Places (NRHP), lists of properties determined to be eligible for listing on the NRHP, and other sources of information. The following is our current knowledge about the presence or absence of historic properties in the action area and the likely effect of the proposed undertaking upon historic properties:

> No known historic properties occur in the vicinity of the proposed project. The majority of the property has been in agricultural use for at least 50 years and studies have shown that shallow plow layers are likely to leave historic properties undisturbed. Because of its position in the landscape (i.e., adjacent to a river), there is a possibility of encountering undiscovered historic resources during construction. The

proponent has coordinated with the Tulalip Tribes (Tulalip). The Tulalip advised the proponent that there remains a chance that undiscovered cultural resources occur on the bank site but that, based on the Tulalip's knowledge of historical sites within the action area, a cultural resource study will not be needed. The proponent has agreed to notify the Tulalip in the event that cultural resources are encountered during construction.

The District Engineer invites responses to this public notice from Federal, State, and local agencies, historical and archeological societies, Indian tribes, and other parties likely to have knowledge of, or concerns about, historic properties in the area.

PUBLIC HEARING – Any person may request, in writing and within the comment period specified in this notice, that a public hearing be held to consider this proposal. Requests for public hearings shall state, with particularity, the reasons for holding a public hearing.

EVALUATION – The Corps is soliciting comments from the public; Federal, State, and local agencies and officials; Indian tribes; and other interested parties in order to assist in developing fact upon which to base a decision by the Corps and the MBRT as to whether or not to authorize the proposed mitigation bank. For accuracy and completeness of the record, all comments in support of, or in opposition to, the proposed mitigation bank should be submitted in writing setting forth sufficient detail to furnish a clear understanding of the reasons for that support or opposition.

ADDITIONAL EVALUATION – The State of Washington will review this proposal for consistency with the Washington Coastal Zone Management Program and for compliance with the applicable State and Federal water quality standards pursuant to Section 401 of the Clean Water Act. The proposed bank will likely require Shorelines Management Act Substantial Development authorization and Hydraulic Project Approval from the State of Washington, as well as authorization from Snohomish County.

COMMENT AND REVIEW PERIOD – Written comments submitted in response to this public notice will be accepted and made part of the record and will be considered in determining whether it would be in the public interest to authorize the proposed mitigation bank. Comments should reach this office, Attn: Regulatory Branch, not later than the expiration date of this public notice to ensure consideration. Comment letters should reference the following name and reference number:

Skykomish Habitat, LLC
200300879

Encl

Prospectus for the Skykomish Habitat Mitigation Bank Monroe, Snohomish County, Washington

Prepared by
Skykomish Habitat, LLC
and
Pentec Environmental

April 15, 2004
12597-07

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Prospectus for the Skykomish Habitat Mitigation Bank Monroe, Snohomish County, Washington

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PROSPECTUS FOR THE SKYKOMISH HABITAT MITIGATION BANK MONROE, SNOHOMISH COUNTY, WASHINGTON

INTRODUCTION AND BANK OBJECTIVES

Skykomish Habitat, LLC, proposes to restore and enhance salmonid habitat and wetlands through the creation of a braided, side channel complex along the north bank of the Skykomish River, approximately 2.5 river miles upstream of the Snohomish River confluence for the purposes of establishing a compensatory mitigation bank.

Observations of other functioning side channel habitat complexes indicate that a balance of surface water flow, shallow groundwater discharge, and hyporheic interflow provide the appropriate hydrologic conditions for a well functioning side channel zone. Skykomish Habitat, LLC proposes to restore a side channel and riverine wetland complex that mimics and restores the hydrologic function and geomorphic processes observed in natural systems, relying on a dynamic combination of surface water and groundwater supply.

The project includes three primary habitat goals:

- Maximize juvenile salmonid habitat throughout the project area by restoring natural function to existing, remnant side channels and increasing the area of this complex;
- Increase the area and function of riverine wetlands and riparian areas adjacent to the restored channels; and
- Enhance the existing wetland complex along the toe of the bluff.

The project will be completed in two phases. Phase 1 will restore riverine connections and create wetlands in the southwestern (downstream) portions of the site. Surface water flow will drive channel formation during higher river stages, typically in winter and spring, as the constructed channels are accessed by an increasing water surface. Stream power associated with these flows will create the dynamic channel shifting and depositional features that lead to complex habitat formation such as scour pools, undercut banks, and recruitment of large woody debris (LWD). The periodic flushing from surface flow will also ensure that excess sediment does not build up near the channel outlet and prohibit fish access to and from the river's mainstem.

Preliminary analyses demonstrate that adequate shallow groundwater is available to provide the side channels with cool pools for summertime refugia during periods of lower flows.

Riparian wetlands will also be created as part of Phase 1. The riverine wetlands will be adjacent to the restored side channel area and will serve a critical role in flood attenuation and improved water quality, as well as providing rearing habitat for juvenile salmonids during high river stage, and habitat for amphibians, birds, and mammals year-round.

Phase 2 work follows as a logical expansion from work conducted during Phase 1. Phase 2 will be implemented at our option, the timing of which will be based on both the performance of Phase 1, and economic feasibility. During Phase 2, similar strategies will be applied to the eastern (upstream) portion of the site through implementing a controlled release of the river onto the site, allowing surface water to meander naturally through constructed pilot channels over a larger, unrestricted portion of the site. Expansion of the Phase 1 wetland area is also planned for Phase 2. Greater detail of the design plan is provided within the text of this document.

The Skykomish Habitat Mitigation Bank will be able to serve public and private end users by providing advance compensatory mitigation for authorized impacts to regulated areas that require mitigation, mitigation for enforcement claims, off-site Natural Resource Damage Assessment offsets, Section 7 violations (relating to threatened and endangered [T&E] species issues affecting Puget Sound salmonids), and similar uses. The unique nature of the site allows for the effective in-kind replacement of lost functions and values including:

- Stream Channel and Endangered Fisheries Habitat;
- Wetlands Habitat;
- Riparian Habitat; and
- Upland Habitat.

Out-of-kind replacement may be eligible where a significant ecological lift can be gained through the use of mitigation credits.

It is <u>not</u> a goal of this project, nor will it be a result of this project, to enable applicants to subvert or bypass the regulatory processes protecting critical areas and habitats, but rather to offer an effective environmental replacement as an alternative to traditional mitigation methods.

PROJECT LOCATION

The ±260-acre site is located along the north bank of the Skykomish River in Sections 11 and 14, Township 27 North, Range 6 East, in Snohomish County. The site is located directly south of Monroe, approximately 2.5 miles upstream from the confluence with the Snoqualmie and Snohomish Rivers. The site is situated at the end of 177th Avenue SE, landward of the Hansen dike.

The property is owned by Academy Holdings, LLC, a member of Skykomish Habitat, LLC, and is currently a mixed-use area consisting of residential buildings, agricultural facilities, undeveloped pasture, and privately owned recreational facilities including ball fields and an off-road vehicle park.

RATIONALE FOR SITE SELECTION

The idea for the Skykomish Habitat Mitigation Bank developed as a direct result of the recognition by the landowners, upon consultation with government agencies and local scientists that this particular 260-acre site presents a unique opportunity for large-scale ecological restoration. This project will fill a need that has been identified by local scientists, academics, and government agencies to restore off-channel and side channel habitat in the lower Skykomish River Basin. This project offers a rare opportunity to actively restore natural function to a large parcel of riverside property and conserve it in perpetuity as part of a mitigation bank, rather than simply preserving open land through a conservation easement.

Historical aerial photographs and topographic data reveal that the Skykomish River in this reach has been subject to consistent channel migration, shifting, and braiding over time. Earliest photos (1933) show a significant cutoff meander toward the north of the then-existing channel, indicating a previous shift in channel location. USGS topographic maps, based on 1952 photogrammetry data, show multiple channels throughout the reach. The existing gravel bar adjacent to the project site exhibits several side channels in various stages of development and function.

Lateral controls along the Skykomish River upstream and throughout the project reach have inhibited and altered the natural processes of channel evolution. Earthen berms and riprap dikes were constructed to protect landward structures and agricultural fields from the frequent high-flow events that characterize the basin hydrology. A decline in the proportion of Skykomish River chinook salmon spawning in the reach has been documented coincident to (but not necessarily as a result of) river hydromodifications between Monroe and the confluence with the Snoqualmie River (SBSRTC 1999).

Through the targeted removal of control structures and by initiating channel braids, we intend to restore the natural connection to the floodplain that promotes the formation of complex channel patterns and creates the high-quality side channel and backwater habitat that is recognized as critical for salmonid spawning and rearing habitat (Spence et al. 1996).

Whereas a similar effort to remove a flood control dike might produce negative impacts to surrounding property owners on other properties, in the case of the Skykomish Habitat Mitigation Bank site, controlled breaches of this dike may actually help protect surrounding property by providing flood relief to properties immediately upstream on the opposite side of the river. In addition, the constructed side channel complex will also help alleviate flooding by increasing conveyance during peak flows.

The project site displays characteristics consistent with braided channel formation. Several factors associated with braided channel evolution are evident along the project reach, and are encouraging for design results, including abundant bed load, erodible banks, a highly variable discharge, and high stream-power potential. To exhibit the desired braiding, a river must be sufficiently powerful to erode its banks and achieve high bed mobility. None of these conditions appears to be sufficient on its own to produce braiding, although an abundant bed load, erodible banks, and relatively high stream power are probably necessary. Where these factors occur in association, as in proglacial areas, braiding tends to be most prevalent (Knighton 1984).

Relevance to Regional Habitat Goals

This project should be viewed in the context of the other restoration efforts currently underway in the watershed or planned for the future:

- Snohomish River confluence reach restoration (Snohomish County, SRF Board);
- Skykomish River braided reach restoration assessment (Snohomish County, SRF Board);
- Haskell Slough restoration (Monroe);
- Riley Slough restoration (Monroe);
- Kissee Creek restoration (Monroe);

- Woods Creek Falls protection and restoration (Sultan);
- Snohomish Basin Mitigation Bank; and
- Fox Creek Restoration.

Although these other projects increase the overall benefit of the proposed project, none are as significant in scope or anticipated benefits as the proposed Skykomish Habitat Mitigation Bank. Additionally, the success of the Skykomish Habitat Mitigation Bank will benefit every other restoration project in the basin. The Snohomish River Basin Salmonid Habitat Conditions Review (SBSRTC 2002) rated riparian habitat in the lower mainstem Skykomish River as degraded due to losses of wetlands, riparian zone vegetation, and instream LWD. This reach was also rated moderately degraded with respect to shoreline condition and floodplain connectivity as a result of diking and bank hardening. Elevated water temperatures throughout this reach has also been identified as a water quality concern.

The Snohomish River Basin Chinook Salmon Near Term Action Agenda (SBSRF 2001) highlights restoration of riparian function and floodplain connectivity as key, near-term actions in this reach of the Skykomish River to promote salmon recovery. The proposed Skykomish Habitat Mitigation Bank directly responds to the needs identified by these recent analyses.

The benefits of the complex habitat created by braided side channel systems have been well documented (Spence et al. 1996, Slaney and Zaldokas 1997, Montgomery et al. 2003), and the reduction of this habitat type in the Puget Sound basin has had significant effects on the biogeography and abundance of native salmonids (Montgomery et al. 2003). In the Snohomish River Basin, removal of riparian and floodplain vegetation began in the 1860s, and agriculture was well established by 1900. This land use conversion has had a significant impact on the existence of the historically productive off-channel habitats. The primary goal of this project is to restore a portion of that habitat loss.

The creation and restoration of side channel habitat has been reported to significantly increase salmonid populations, allowing juvenile salmonids to be protected from peak flows and providing stable overwintering habitat (Slaney and Zaldokas 1997). In addition, stream reaches with unaltered wetlands associated with the stream channel were reported to have salmonid densities two to three times greater than reaches with altered wetlands (Montgomery et al. 2003).

In addition to side channel restoration, Skykomish Habitat, LLC proposes to enhance or restore floodplain wetlands within the project area. Some of these areas were historically wetlands and contain remnant wetland features suggesting that they could be restored relatively simply. Through effective enhancement and restoration of these critical areas, the overall ecological lift resulting from the project is significantly increased as supporting floodplain wetlands are vital to proper function of side channel habitat. As such, the existing on-site conditions suggest that this type of restoration proposal to include a floodplain wetland component is a natural extension to the side channel restoration proposal. The functional mosaic that would result reflects the greatest maximization of potential restoration activities.

EXISTING CONDITIONS AND ENVIRONMENTAL CHARACTERIZATION

Site Morphology

We have examined the geomorphology of the Skykomish River above, below, and throughout the project reach. Using topographic maps, multiple aerial photograph series, and previous basin studies, we have established a reasonably thorough understanding of the behavior and trends of the river. This will guide the final design and enhance sustainability. Geomorphic parameters will be further examined during design including geologic setting, channel planform and cross section evolution, sediment load, and the influence of recent human development. The following paragraphs briefly address work completed to date and ongoing tasks that will be completed to inform design.

The project site is located between river mile (RM) 1.8 and 3.0. The reach is located where the Skykomish transitions from a mountain river to a lowland river, just above its confluence with the Snoqualmie River. The Snoqualmie River occupies a subglacial drainage trough and is depositional in the reach immediately upstream of its confluence with the Skykomish. The project reach is also likely within a subglacial trough, although immediately upstream, the valley width is indicative of an alpine glacial trough.

The channel immediately adjacent to the project site has been relatively stable during most of the 20th century. However, farther downstream, at RM 0.3, erosion has accelerated recently. At that point, bank erosion was minor between 1948 and 1965, approximately 1 meter/year. Between 1965 and 1976, the bank eroded at 6.2 m/year; between 1976 and 1995, the bank eroded at 2.5 m/year. Erosion accelerated greatly during the last 8 years, about 21 m/year. The acceleration of bank erosion downstream of the project site likely represents a through-put of sediment from upstream.

Cross section data compiled by Snohomish County indicate a minimal change in channel shape between 1976 and 1991 at RM 2.0. At RM 2.25, the right bank, where the project is located, experienced vertical and lateral accretion between 1976 and 1991.

The gradient of the Skykomish River is substantially higher than that of either the mainstem Snohomish River or the mainstem Snoqualmie River. The gradient at the project site is about 0.15 percent, which is significantly lower than upstream. Between Gold Bar and Sultan the gradient is 0.27 percent. This last reach is a braided channel.

The total bedload at Monroe has been estimated at 36,000 tons/year. This represents only 10 percent of the total sediment load, but is the most important component with regard to channel formation and sustainability of side channels. Bedload movement along the project reach is initiated at about 8,000 to 10,000 cfs.

Gravel mining at the Monroe Cadman facility has played a substantial role in the geomorphology of the project reach. 50,000 cubic yard (cy)/year of gravel were extracted above the project site between 1961 and 1969. This decreased the size of the large gravel bar at this location, RM 2.7. Prior to gravel extraction, the gravel bar at the site accreted at an average rate of 3,000 cy/year. Between 1969 and 1976, the gravel extraction averaged 15,000 cy/year and the gravel bar grew slightly. Between 1976 and 1979, the gravel extraction rate was approximately 12,500 cy/year; the gravel bar did not decrease in size nor did it increase to its former size.

Topography

The interior of the site consists of more varied topography on the west half of the site and relatively flat topography on the east half of the site. The varied topography on the west half of the site is due to the presence of wetlands, agricultural drainage channels, and constructed off-road motorcycle (motocross) tracks. The east side of the site consists of livestock pens, agricultural fields, privately owned soccer fields, and softball fields in the northcentral area, and a picnic area on the south end. The east side of the site is relatively flat with a 0.4 to 4 percent slope downward from the northeast toward the west-southwest.

There is a flood-control dike that was constructed along the east side of the property adjacent to the Skykomish River, and 177th Avenue SE was constructed on top of this dike. At the time of the site investigation, the dike terminated near the southernmost farm building on the site just north of a gravel bar on the Skykomish River. The site is bounded by the Skykomish River on the east and south sides, a 200- to 300-foot-high, steep ridge on the west side, and an open plain sloping upward to the correctional facility to the north. There are scattered pockets of trees and bushes across the site, and wetlands on the west side of the site; however, over 90 percent of the site is open grassland, agricultural, or privately owned recreational land.

The northeast corner of the site has more uneven topography, with scattered bushes and small trees. A composting and brush grinding facility, operated by the landowner, also exists in this area. A small depression exists in the northeast corner of the site that is filled with water during wet periods of the year. The dike (referenced above) has been constructed along the northeast corner of the site. According to Snohomish County, this dike was breached during the 1990 floods and rebuilt by the U.S. Army Corps of Engineers (Corps) shortly thereafter. The dike and road are owned by Snohomish County. The dike was rebuilt at the same elevation, but a 5:1 backslope was added, along with a quarry spall top underlying the road surface and some additional fill extending off the landside toe of the dike. The purpose of the quarry spalls was to armor the top surface (which was not paved until 2001) and reduce erosion during overtopping events.

A 6- to 8-foot abrupt elevation drop and drainage is present along the north side of the property, extending from east to west. The easternmost 600 feet of this drainage is designated as a wetland, and abruptly ends where it meets the foot of the ridge on the western boundary of the site.

Approximately 800 to 1,000 feet south of the north boundary of the property, an approximately 1-acre open water pond (northern pond) with surrounding wetlands is present against the base of the western ridge. An intermittent stream and wetlands are present south of the pond, and extend southward to an approximately 2-acre pond (southern pond) adjacent to the Skykomish River. There are three finger drainages branching off from the main intermittent stream channel on the west side. The northern finger channel extends out approximately 500 feet southeast from the east end of the northern pond. The central drainage channel extends approximately 400 feet northeast to the main motocross track, then approximately 800 feet east-northeast along the southern edge of the motocross track. The southern finger channel begins approximately 600 feet from the northern end of the southern pond and extends northeast approximately 600 feet.

The southern area of the site is separated from the main channel of the Skykomish River by gravel bars and a small island. Water flows adjacent to the south side of the site when the river is high enough; however, most of this area was a dry gravel bed in August and September 2002. Isolated pools exist in this area, which are spring-fed from the bottom. The spring flow was evident by observing small sand boils in the bottom of the isolated ponds.

Soils

Alluvial sediments of the Puget-Sultan-Pilchuck soil unit underlie the site. These soils consist of well drained silts, sand, gravel, cobbles, and combinations of these soils deposited by the Skykomish River. The alluvium is underlain by volcanic bedrock of Tertiary age. Soil samples were collected while installing monitoring wells throughout the site.

Materials Encountered

Borings were advanced throughout the site to depths from 13 to 27 feet below the ground surface. The general conditions encountered in the borings consisted of:

- 2 to 5 feet of silty loam topsoil; over
- 3 to 18 feet of silty sand, sand, and gravelly sand; over
- 0 to 19 feet of river wash gravel and cobbles to the total depth of the borings.

The materials typically became coarser-grained with depth. In general, more gravel was present at lower depths in the borings located closer to the Skykomish River, and the soils encountered contained much more silt along the western boundary of the site. Because the environment of deposition was alluvial, there is expected to be variation in material thickness and lateral extent between borings.

Topsoil

The topsoil encountered contains organic material and roots, and supports native grasses and crops. Hydric (wetland) soils are present along the west side of the site. The color ranged from dark reddish brown to grayish brown and yellowish brown, and was categorized according to the Munsell Color chart to be 3 to 4 values and darker chroma of the 2.5 YR, 5.0 YR, or 10 YR hues.

Silt

A 3-foot-thick horizon of gray-brown silt underlies the topsoil along the west side of the site. The presence of this silt may be a result of sloughing of the bluff along the western edge of the site onto the floodplain to the east. The presence of silt along the west side was also inferred by the much higher turbidity readings measured in the groundwater from piezometers in this area. The silt was measured to have a fines content ranging from 86 to 87 percent, a liquid limit of 33 to 44, and a plasticity index ranging from 2 to 4.

Sand

Sand was the predominant material encountered in the borings. Sand layers throughout the site are variable, ranging from well graded (gravelly to fine-grained) to poorly graded, fine, silty sand. The majority of the site sand was poorly graded, silty sand. The permeability of the poorly graded, silty sand was measured to range from 2.56×10^{-3} centimeters per second (cm/sec) to 3.63×10^{-3} cm/sec.

Gravel

Gravel layers were encountered in 16 of the 30 borings, predominantly on the eastern side of the site. Where encountered, the gravel was always encountered below sand at a depth ranging from 5 to 22 feet below ground surface, with an average depth of 13 feet to the gravel. The majority of gravel was well graded, containing sand and silts. The measured gravel ranged in size from 0.2-inch pea gravel to 6-inch-diameter cobbles, and was rounded to sub angular.

Hydrology

Design of the proposed side channels and wetland complex requires a thorough understanding of the site hydrology and water surface elevations. Side channel design will assure access by frequent flow events in the Skykomish River. This will create immediate habitat benefits from the side channels and allow for annual utilization of various side channel components on an annual basis, thus maximizing the potential project success.

Data from permanent USGS gaging stations in the river basin were utilized to account for specific flow conditions at the project site. Two gages along the Skykomish River provide the necessary data to determine flow conditions at the site: the first is located on the Skykomish upstream of the project site near Gold Bar, Washington, and the second is located on the Sultan River, the largest tributary between the gage in Gold Bar and our project site.

The largest peak flows for each period of record were downloaded for both gages. The Sultan River is a regulated river and thus provides unnatural responses to flood events, making flow predictions to storm events difficult to determine. The Sultan River gage contains records from 1984-2002, whereas the Skykomish at Gold Bar gage included records from 1928-2002. To best model the flow at the project site, we compared data from the two gages, first during years of dual operation, then for storm events during those years. We compared floods from storm events less than 7 days apart and an average difference of 12 percent was calculated. We applied this 12 percent to the longer flow record of the Skykomish and the flood events were ranked by magnitude (cfs). We calculated the recurrence interval and plotted a best-fit line to calculate flood magnitude and frequency.

For further accuracy, we compared our data to the results from the FEMA basin modeling. The FEMA data used the same dataset but modeled flood flows using the Log Pearson III model, and assumed a different relationship between the Sultan and Skykomish Rivers. The two outputs are nearly identical at low flow events (<5 year), which are critical for the proposed design. Table 1 presents flow intervals calculated for the project site and the associated water surface elevations.

To calculate water surface elevations from the hydrology data, it is necessary to employ a one or two dimensional surface flow model. We modified a basin model developed for FEMA to calculate water surface profiles at the project site. The water surface elevations corresponding to the different flood flows at the project site are shown on Figure 2. The FEMA model gives the water surface elevations for the 10-, 50-, and 100-year flood flows. A HEC-RAS model developed for this project was used to compare the FEMA modeling results.

The calculated water surface profiles shown on Figure 2 do not account for the anticipated changes in site hydrology that will result from the lowering, removal, or breaching of the levee that will take place as part of Phase 2 design. We would expect a lowering of the water surface as flood conveyance increases throughout the project area. A more detailed model will be created during the design phase to account for the modifications to the levee, and the design will be modified accordingly.

Groundwater

To adequately characterize groundwater and inform the design process, water table elevations and groundwater quality measurements were obtained from August 2002 through January 2003. The formation of current and any future wetlands on the site depends heavily on the groundwater regime that sustains the necessary hydrologic environment. Preliminary studies have been completed on groundwater elevations and quality, and the results are summarized here. Current groundwater studies are underway to characterize the movement of groundwater through the site and how that may influence both wetland and channel design. Another concern that we are assessing is how the design may, if at all, impact the current wetland regime by interacting with groundwater resources.

Groundwater Elevations

The lowest measured groundwater level to date was measured on November 7, 2002. Groundwater levels are relatively flat, with an average seasonal-low water level elevation measured to date of 28.5 feet NAVD 88. The direction of groundwater flow suggested by the groundwater contours is toward the south and southwest at a gradient of between flat and 0.25 percent.

The individual piezometer and average groundwater elevations measured to date are provided in the Site Characterization document (Shaw 2003). It can be seen that by comparing the interpolated seasonal-low surface water elevations of the Skykomish River with the nearest piezometer water level elevation, the groundwater level elevation appears to be approximately 0.8 foot above the Skykomish River. This minimal drawdown is consistent at both the upstream and downstream ends of the site, suggesting that the groundwater level is directly connected to the fluctuations in the Skykomish River.

Groundwater Quality

Results of the groundwater quality assessment present a wide-range of values for key parameters such as temperature, dissolved oxygen, pH, turbidity, and conductivity. The data are available in the Site Characterization (Shaw 2003). To summarize, there are no indications that groundwater quality will be a limiting factor in the development of juvenile salmonid rearing throughout the site. Design features, such as pool formation and revegetation will regulate the ambient controls on groundwater temperature, the key parameter for summertime survival in isolated pools and off-channel zones.

Wetlands

Shaw Environmental wetlands biologists conducted a non-jurisdictional wetlands analysis on July 11 through 15, 2002. The wetland boundaries were determined and mapped using the Routine Determination Method per the Corps (Wetland Delineation Manual 1987) and the Washington State Wetlands Identification and Delineation Manual (Ecology 1997). Due to the disturbed condition of the site, guidance for atypical situations in Section F of the Washington State Wetlands Identification and Delineation Manual was used. The three parameters for distinguishing wetlands include hydric soils, hydrophytic vegetation, and hydrology. Three distinct wetland areas were located along the western property boundary. Those areas determined to be wetlands were delineated and flagged with wetland flagging and professionally surveyed by W&H Pacific. Wetland locations are shown on Figure 3 and in the appendices of the Site Characterization (Shaw 2003) report.

Shaw located three distinct wetland areas along the western property boundary designated as W-1, W-2, and W-3. W-1 and W-2 are continuous from a pond where W-1 originates to approximately 400 feet north of the Skykomish River where the wetland becomes entirely riparian, continuing south to the river with no significant interstitial areas. W-3 is located along the northwest corner of the property and appears to be isolated from W-1 and W-2.

Each wetland has been disturbed along all or part of its edges. Historical land use has impacted each wetland, necessitating the use of the disturbed/atypical criteria. Due to recent plowing and regrading, hydrophytic vegetation was not present within the wetland in many areas. The general depth of disturbance from plowing was 6 to 8 inches. The presence of hydric soils was used as the main criterion for delineating these areas, and the accepted depth was increased to 18 inches below ground surface in most areas, based on guidance for atypical situations. These hydric soils appear to have been formed prior to the site disturbance.

The primary soil type within the wetland areas was a dark, grayish brown, silty clay loam that appears to be consistent with Puget silty clay loam, one of the mapped soil units described on the property within the Soil Conservation Service (Debose and Klungland 1983) Soil Survey of Snohomish County Area Washington. Puget soils are listed as hydric within the Hydric Soils List for Washington (Debose and Klungland 1983). In most areas, the Puget soils were highly mottled (15 to 20 percent), indicating the presence of saturation for a duration long enough throughout the year to cause redoximorphic conditions.

Field data sheets for the initial wetland study are located in Appendix B of the Site Characterization (Shaw 2003). Based on the Washington State Wetland Rating System for Western Washington (Ecology 1993), wetlands W-1 and W-2 would be classified as Category III wetlands under current conditions. Disregarding human disturbances to wetlands W-1 and W-2, they might otherwise be classified as Category II wetlands. Wetland W-3 would be classified as a Category IV wetland due to its isolated nature and lack of surface connectivity to nearby surface water sources. The functions and values of this wetland would be rated low independent of the disturbed condition.

Because of the disturbance along the boundary, Shaw appropriately followed the guidance for atypical situations. The report described the conditions along the boundaries of three wetlands along the west end of the property. Data sheets for 20 sample plots are included in the report and document the conditions and indicators used to delineate the wetland boundary. Sample plot locations and the delineated wetland boundary are shown on a survey map included in the report.

Following Pentec's review of the wetland report, a site visit was conducted to confirm methods used and the delineated wetland boundaries. Pentec and Shaw wetland scientists conducted a site visit on December 3, 2003. Because more than a year had passed since the delineation was conducted, the flagging and stakes used to mark the wetland boundary were no longer visible or were non-existent. The description of the wetland and upland conditions at the sample plots described in the report match the site conditions during the site visit. Although the wetland section of the report describes the wetland delineation as "non-jurisdictional," it is apparent that the conservative methods used (atypical conditions) resulted in a wetland boundary along what appears to be the jurisdictional boundary.

Pentec recently completed a more comprehensive wetland delineation. The wetland delineation report can be viewed as a separate document. We are in the process of having the Corps review the delineation report to satisfy the requirements of a jurisdictional wetland delineation. We expect that this will be finalized sometime in the spring 2004. The report includes descriptions of the wetlands, the indicators used at the sample plots to delineate the boundary, classification of the wetlands, general descriptions of the wetland and upland areas near the wetlands, all data sheets from sample plots, and a map showing the delineated wetland boundaries.

Existing Site Acreage

The property owned by Academy Holdings consists of seven separate tax parcels that total just less than 260 acres. The area planned for bank development and habitat improvements is approximately 240 acres.

The approximate acreage of land cover and habitat types associated with the existing project area are shown on Figure 3.

Stream Channels	3 acres
Riparian Zone	23 acres
Wetlands	21 acres
Non-functional	191 acres
Forested Upland Areas	0.0 acres
Total	238 acres

For the purposes of the mitigation bank, we have defined and calculated the anticipated acreage of the above habitat types through an ecological perspective, rather than an administrative definition provided by a particular city's or county's Critical Areas Code.

Wetlands are defined by the Corps jurisdictional Wetland Delineation Manual as, "Those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

The "existing" acreage presented above is an estimate based on a preliminary, non-jurisdictional wetlands study conducted in May 2002. A thorough, and complete, jurisdictional wetland delineation that more accurately defines the existing wetland boundaries was conducted in March 2004. Upon approval of the wetland boundaries by the Corps, we will update the wetland areas. This process will be replicated in the future phases of the project to accurately define newly created wetland boundaries for the purposes of credit allocation. The Corps will retain oversight over the entire process.

Stream Channels are defined as those areas that have the potential for a surface water connection to the Skykomish River at any range of flows, including side channels and associated off-channel refugia. As the primary purpose of the bank is to create much-needed rearing habitat for juvenile salmonids, side channel zones will have only a periodic connection to the mainstem Skykomish River, particularly to provide lower velocity refugia during high flows (winter, spring) and isolated, shaded, lower temperature pools for summertime rearing. Considering that the design intends to allow for the river itself to form and create these areas, in the context of a controlled return to natural processes, we have defined a broader area than just the width and length of the design channel as stream channel. We fully anticipate, and will design for, that the constructed channels will erode, shift, and braid to create the type of complex habitat that is most beneficial to rearing juveniles, with undercut banks, scour pools, shifting substrate, shade, and LWD.

Riparian Zones are defined by the ecological value that they provide to stream channel and side channel areas, and are not limited by the stricter, and less ecologically based administrative definitions presented in municipal and county ordinances. Riparian areas can be described simply as the transitional zones between aquatic and terrestrial (or upland) environments. Therefore, riparian areas occur as a belt along the banks of rivers, streams, and open water bodies. Riparian areas occurring along the banks of moving water are often called lotic systems whereas those occurring along the banks of stationary water are called lentic systems. As a transitional zone between aquatic and upland environments, riparian systems often exhibit characteristics of both; but they are not as dry as upland environments and they are not as wet as aquatic or wetland systems.

In the context of the proposed bank, riparian zones include the large lotic and lentic areas adjacent to side channel areas and the wetlands that support riparian vegetation and provide essential functions for open water areas, such as shade, flood conveyance, bank cohesion, sources of large woody debris, etc.

Upland Areas refer to those areas that are above an elevation of frequent inundation and support upland vegetation, and are not adjacent to areas with a surface water connection to the Skykomish River. These areas do not support either aquatic or riparian vegetation, and are forested with native upland species such as fir and cedar. Upland areas serve an important role in providing a terrestrial buffer around sensitive riparian and wetland zones. The buffer is home to birds and mammal species that rely on open water and riparian zones for prey.

Under the existing conditions, there are no areas that satisfy these criteria within the project boundaries. During Phase 1 we propose to re-forest an elevated area above existing wetlands that will serve as excellent habitat for terrestrial species that utilize the wetlands for forage or predation.

Non-functional Areas are defined as those areas currently not supporting any of the above habitat types. This definition is limited to areas of the existing property currently containing homes, barns, and other outbuildings; recreational facilities; or abandoned agricultural fields. We recognize and understand that these areas may indeed currently provide some ecological value to the site, such as feeding areas for raptors and flood conveyance for extreme events. However, these zones lie outside of any currently functioning wetlands, stream channels, riparian, or upland habitats. For the purposes of ecological accounting in the bank, these areas are classified as non-functional.

SITE DESIGN

The proposed restoration at the site includes enhancement of the existing side channels to the Skykomish River, restoration of (reconstruction through the creation of) additional side channels, enhancement of existing floodplain wetlands, and significant construction of floodplain wetlands.

The design and construction of the Skykomish Habitat Mitigation Bank will be implemented as a design-build project divided into two distinct phases. Each phase will be designed with the potential to be an independently functioning, stand-alone project, but with the intention of integrating the two phases over time into a larger, fully sustainable system that would provide the greatest potential environmental "lift" from the mitigation bank.

Our approach allows for completing and assessing each phase progressively, and affords the design and construction team sufficient latitude to implement minor design modifications as warranted by site conditions encountered during construction. This flexibility maximizes the probability for successful establishment of each project component. Another benefit of implementing the project in phases is the ability for the project sponsors to collect revenue from credit sales in the early phase to fund the completion of subsequent phased tasks.

Phasing various project elements allows the opportunity to evaluate the formation of constructed channels and monitor the evolving habitat and fish usage. This will facilitate greater application of the Monitoring and Adaptive Management Plan (MAMP). The project phases will be completed in a logical progression, allowing for facility of construction sequencing and site management. In addition, phasing certain improvements such as an early-stage planting regime in areas that will remain undisturbed through construction will allow plants to mature and increase the successful establishment of the desired overstory and understory plant communities. These efforts will help stabilize riparian areas adjacent to side channels and help to achieve habitat goals earlier in the life of the project.

We anticipate the future river environment to reflect changes brought about by removing lateral controls, increasing the width–depth ratio, and initiating braided channel formation. Modifications are expected throughout the entire flood-prone width of the channel cross section from above the upstream limits of the project site to below the downstream border. Altering the manner in which water and sediment move through the river environment at this location will likely affect the overall river channel shape, sediment transport characteristics, and water surface elevation from bank to bank through the project site.

These hydrologic modifications will drive the habitat improvement expected from this project. Ample spawning and deepwater habitat currently exist along the Skykomish River, although, as noted above, chinook spawning in the reach below Monroe has dropped markedly over the last three decades. It is widely recognized (SBSRTC 1999 and 2002) that the elimination of side channel habitat and adjacent wetlands during previous hydrologic modifications to the river has severely reduced rearing opportunities, especially for chinook, and coho salmon in this reach.

This project proposes to create high-quality side channel habitat for salmonid rearing by removing previous controls on the river and restoring the historical floodplain connection. We anticipate that the site hydrology will achieve a balance with the new channel geometry and sediment transport behavior that will create a sustained and self-perpetuating braided channel complex and adjoining riverine wetlands.

Phase 1

The first phase of the project will maximize the existing site characteristics by increasing function of existing side channels and expanding the braided network upstream from just below the farmhouse down to the existing, natural outlet. We propose to re-establish a perennial connection from the Skykomish mainstem to the existing network of side channels on site. Some of the existing side channels no longer function adequately to support salmonid rearing habitat, mainly due to sediment aggradation and a disconnect from frequent hydrologic events.

By constructing functioning side channels that lead into the existing channels, we anticipate providing adequate flow on a more frequent basis to restore channel function, flush channels of sediment plugs, and reconnect isolated habitat. Figure 4 presents the conceptual design for Phase 1.

Side channels will also be constructed through the areas that are now mainly pasture or playing fields. These channels will be excavated through ancient gravel and overbank deposits to a depth that will capture sufficient groundwater discharge during periods of low flow to provide summertime refugia. Shallow groundwater depths are linked with water surface elevations on the Skykomish River (Shaw 2003). Accordingly, channels will be excavated approximately between 8 and 12 feet below existing grade to capture groundwater levels coinciding with low river stage. Overflow channels will be constructed (Figure 4) at higher elevations than the main channels; this will provide for relief of stream power at high flows, as well as promote channel shifting and braids between the principal channels. Side channels will be constructed to provide zones of lower velocity at high river stage and refugia for juvenile salmon at lower flow periods. Side channel structure will incorporate gravel substrate, in-stream LWD, and various types of pool structures.

For the purposes of credit calculation, we define salmonid habitat as the side channels plus the immediate adjacent riparian habitat and the overflow channels and braids that develop or are constructed on both sides of the main salmonid channels. Considering that the most effective juvenile salmonid habitat is created through the dynamic processes of channel shifting, pool formation, and LWD recruitment, we intend to design channels in a way that will be subject to expansion and shifting over time. Thus, the footprint of the stream channel and salmonid habitat zone will not be static, but rather shift over time according to the natural hydrologic regime of the river and side channel zones.

Phase 1 will also have a significant wetland creation component. Existing wetlands on the southern end of the property will be expanded to create a wetland complex that may interact with the side channel zone. Riparian wetlands will provide significant habitat, water quality, flood attenuation, and sedimentation benefits. Pockets of perched wetlands will also be created throughout the existing dirt-bike track, in areas of low elevation that can support wetland hydrology. In areas of higher elevation along the dirt-bike track, we will replant upland vegetation and restore habitat for terrestrial species that interact with the adjacent wetland and side channel zones.

When Phase 1 is complete, a dynamic environment encompassing the mainstem Skykomish River, associated side channels, riparian areas, riverine wetlands, and forested uplands will support quality habitat for endangered salmonids at various life stages, amphibians, birds, mammals, and microorganisms. This will be created in area currently supporting abandoned agricultural fields and recreational facilities.

The approximate anticipated habitat gain for Phase 1, presented in Table 4 and shown on Figure 4 is:

Stream Channels	13 acres
Riparian Zone	2 acres
Wetlands	64 acres
Forested Uplands	14 acres

Phase 2

The second phase of the project will be a natural extension of the work completed for Phase 1. Based on an ongoing assessment of Phase 1, the project sponsors may choose to expand the channel network to the northwest (upstream). Figure 5 presents the conceptual design for Phase 2. Phase 2 will expand the side channel complex constructed in Phase 1 to include the land supporting the farmhouse and the outbuildings. Wetland restoration for Phase 2 will include expansion to the north, encompassing the areas now supporting the softball field complex.

Considering the significance of demolishing the on-site residence and buildings for the project, we anticipate a thorough evaluation of the physical function as well as the economic performance of Phase 1, and the potential performance of Phase 2 before moving forward with this phase.

Construction for Phase 2 will be very similar to Phase 1. Another advantage of taking a phased approach is the opportunity for Phase 1 to mature and stabilize over time. Riparian vegetation and channel structure will be better established and will provide structural stability for the subsequent phase. This is significant because channels built in Phase 2 will increase the overall load to the Phase 1 channel complex. These effects will be anticipated and accounted for in the initial design of Phase 1.

Implementation of Phase 2 could potentially include constructing a breach in the existing dike to supply surface water to the head of the channel system. In this event, we anticipate a controlled break in the dike that will be carefully engineered and constructed to limit flow into the project at the desired flow volumes. As channel structure evolves, vegetation will mature, adding stability and cohesion to the channel banks and islands. We anticipate that as the site matures, the inlet controls could be reduced or eliminated to allow for a completely natural inflow of surface water into the side channel complex; additionally, the dike may ultimately be reduced in height or removed completely to restore full function and floodplain connectivity. There are several regulatory challenges that must first be met to decommission an active levee. Until such time, we anticipate that the inlets along the dike may be maintained by a compound structure, with a hard structural base attached to an engineered log jam. This will prevent excessive flooding during the maturation stage of the project and will limit full channel migration into the constructed channels until the time when the side channel network is robust and able to function under full flood conditions.

The estimated acreage of increased habitat for Phase 2, presented in Table 4, and shown on Figure 5 is:

Stream Channels	30 acres
Riparian Zone	25 acres
Wetlands	44 acres
Forested Uplands	0 acres

Riparian Vegetation and Planting Program

Establishing the native riparian corridor is a key element of the project. Streamside vegetation plays an important role in the site ecology, cooling waters through shading and providing a source of both large and small woody debris for habitat enhancement. Riparian vegetation is crucial in providing insect prey to rearing salmonids and degradable leaf litter for aquatic benthos (Spence et al. 1996). Considering the anticipated dynamic nature of the proposed channel network, we will conduct a focused riparian planting program that is consistent with the project goals and does not overplant areas where we may expect channel migration. Plantings will be limited to "terrestrial islands" within the project zone that may be stabilized to prolong survival. These planting cells will provide a secure seed source that will propagate vegetation throughout the entire project area, along with natural succession and seed source provided from the river. As suggested earlier, these areas are anticipated to be planted prior to the commencement of earthwork, where feasible, to provide plantings the maximum amount of time to stabilize and begin to mature.

Phases 1 and 2 will focus on both wetland and riparian species, and upland vegetation in key upland/buffer areas, as appropriate. Table 2 presents a list of potential riparian, wetland, and upland vegetation for the project site. Specific planting techniques and species selection will be based on future investigations.

ECOLOGICAL BENEFITS

Restoration of off-channel and side channel habitat in the lower Skykomish River has been identified as one of the principal actions necessary to restore salmon habitat (SBSRF 2001 and SBSRTC, personal communication). However, relatively little work has been done and virtually no Skykomish River data exist to define where in the lower river juvenile salmonids are currently rearing, and what microhabitat types those fish are using. Nonetheless, we expect that considerable importance can be assigned to the summer/fall rearing and overwintering function of this area. For example, during multiple site visits in June and September 2003, we observed substantial numbers of coho salmon fry (Jim Starkes, personal communication) feeding in several pools throughout the existing side channel that runs along the downstream portion of the site.

The goal of the proposed habitat bank is to provide rearing and overwintering habitat for juvenile salmonid species, which is expected to increase the smolt escapement of the salmonid species that use the constructed off-channel habitat. Providing this off-channel habitat is particularly advantageous to this reach of the Skykomish River, where localized diking and channelizing has largely cut off natural side channels. Such reconnection of off-channel habitats with the mainstem is identified by the SBSRTC as a recommended near-term action to promote the recovery of chinook salmon in the Snohomish Basin (SBSRF 2001); chinook in the Puget Sound Evolutionary Significant Unit, which includes the Snohomish Basin, are listed as threatened under the Endangered Species Act (ESA). Coho salmon, a candidate species for listing under the ESA, is another anadromous species in the Snohomish Basin that would benefit from this proposed restoration. Although primarily aimed at juvenile salmonids, adult salmonids, amphibians, birds, mammals, and macroinvertebrates will all benefit from the restored channels and wetland complex.

According to case-study literature (Slaney and Zaldokas 1997), significant improvements in salmonid survival rates are observed when off-channel habitat is available. For example, overwinter survival of juvenile coho salmon was measured at 74 percent over four winters in a natural side channel versus a measured 23 percent in the main channel in Carnation Creek, B.C. Similar off-channel habitat has been seen as advantageous for the survival of juvenile chinook, chum salmon, and coastal cutthroat trout. Steelhead and pink salmon are reported to rear in off-channel habitat to a lesser extent, and pink and chum salmon can be expected to use these habitats for spawning.

Significant benefits will also be provided through the wetland enhancement and creation. Restoration of riverine wetlands will create an ephemeral connection between the Skykomish River and floodplain wetlands. This will create additional pockets of winter and summertime refugia for juvenile salmonids in addition to the increased habitat for amphibians, birds, and mammals. Water quality benefits will result from increased storage, filtration, and sedimentation. Additional flood conveyance and residence time of flood flows in the riverine wetlands will reduce the risks of flooding to upstream and downstream properties.

EFFECTS ON ADJACENT LAND USES

Phase 1

Existing Property

Phase 1 construction will require the conversion of certain recreational facilities, such as the soccer fields and the dirt-bike track. Both of these areas will be converted to wetland or upland zones. . The owner's picnic area, shelter, and some playing fields will be converted to stream channels and riparian zones as part of Phase 1 implementation.

Surrounding Property

Flooding of downstream, neighboring (across river), and possibly upstream properties may become less frequent (see next section). A current concern of property owners located on the opposite bank downstream of the project site is the rate of erosion due to high stream velocities resulting from the Hansen Dike and other bank hardening efforts within this reach of the Skykomish. Phase 1 will slightly reduce the water surface at peak, erosive flows, thereby reducing the erosion rate across the river. Phase 2 will have a more significant effect on this. Neighboring properties may increase in value because of the assurance that this project site will perpetually remain in an undeveloped natural condition.

Hydrology

There is a potential for lowering river stage at a variety of flows through the creation of multiple surface water connections to the site. This will be modeled in greater detail during future design work.

Restoring floodplain connectivity increases the conveyance of water into the floodplain, thereby absorbing discharge into the floodplain more quickly than under existing conditions and moderating higher Skykomish River discharges. Such absorption can delay, reduce, and lengthen the flow peak. This is anticipated to produce a positive benefit by reducing the flood potential to both upstream and downstream properties during moderate events, although the highest flow events will remain largely unaffected, because this part of the floodplain currently has some connectivity with the river and does flood at very high flows.

Potential also exists for localized drawdown of the shallow groundwater surface limited to the area within the project boundaries. The potential drawdown may occur as a result of the increased effective conductivity in the channels cut farthest from the streambank, where groundwater connectivity to the channel network is likely to be greatest. We expect this effect to be slight for Phase 1, but may be more pronounced in Phase 2. If this effect does occur, we expect the effect to be contained within the project boundaries. The potential effect of the channel network on shallow groundwater elevation within the site boundaries will be accounted for in the design of the proposed channels and the associated riparian wetlands complex.

If too many channels were to be constructed, or if the overall channel area were too great, there would be the potential for distributing base flow into too many flow paths, causing all flow to go subsurface into the gravel substrate. This effect will be carefully evaluated during the design phase to avoid producing any negative impact. We anticipate the volume of any potential groundwater augmentation to the Skykomish River would be negligible to overall river stage. The site currently receives shallow groundwater from the river at the northeastern portion of the site and discharges groundwater to the river along the southwestern boundary.

River Morphology

The intent of this project is to accelerate the expected re-establishment of the natural braided channel type through portions of the project area. The dispersal of discharge through the project reach should result in a decrease in stream power through this reach that is likely to increase the sediment deposition there. This phenomenon produces a positive benefit by encouraging natural self-maintenance of a braided river system. The channel is expected to become more dynamic in its lateral movement, shifting among the various dominant channels from year to year, and the project will be designed to account for this. Infilling and reduction of the deep river bend pool that currently exists may occur, but we anticipate the improved habitat provided by the overall system will produce a net-positive benefit to salmonids using this reach of the river.

Sediment aggradation at the outlets to some channels may plug these outlets. We will attempt to minimize this phenomenon by limiting the number of deep channels and by using enough surface water flow to flush sediment through the main channels. Similarly, sediment deposits could temporarily block side channel inlets. This may be corrected by measures such as flow control structures, phasing of the project implementation, and deeper excavation within the proposed braided channel zone. Any negative effects caused by accumulated sediment will be addressed through the Monitoring and Adaptive Management Plan (MAMP) and monitoring protocols and will be corrected, as necessary. We anticipate that once the site has stabilized, the long-term need for sediment removal control will end.

There may be a period when fine sediments are flushed from the excavated areas. The effectiveness of potential sediment trapping ponds that may be constructed at the outlets from excavated areas will be considered during the design phase, and will be included if determined beneficial for erosion control.

Terrestrial and Aquatic Habitat

The creation of additional side channels and reconnection of the river to its floodplain will increase the diversity and quantity of off-channel habitats for fish and other aquatic biota. The additional and deeper flow channels will provide more pool area and volume for both summer rearing conditions at low flow and for refugia at high flows in winter. Active management of riparian vegetation and design of wood and bank structures will provide more cover for fish from predators, more varied substrate for invertebrate prey, and more frequent and visually separated resting and feeding stations for fish.

There may be a reduction in the grain size of salmonid spawning habitat through portions of the new braided reach as a result of decreased stream power in each channel. The reduced stream power may allow gravels to become embedded within more sheltered zones of the channel complex. We anticipate the locally reduced stream power to also result in the accumulation of somewhat smaller, more desirable spawning gravels than those that currently dominate the channel bed. Sediment deposition and reduction of the deep river bend pool that now exists adjacent to the property may occur, but we anticipate substantial net-positive effects on salmonid habitat within the reach.

Phase 2

Phase 2 will have more of the same effects that are described under Phase 1. A principal difference is in the impacts to the existing property. The existing farm buildings and residence will need to be removed to accommodate a surface water inlet through the dike at the upstream property boundary with the Skykomish River. Phase 2 will require modifying access to the property and will eliminate the owner's recreational areas.

Modifying the current dike structure will require public involvement and potentially extensive agency consultation. Based on preliminary reactions from stakeholders surveyed, there seems to be positive support for the reduction and/or elimination of the dike, as it should significantly reduce flood elevations and decrease the rapid erosion of riverfront property along the opposite bank. Phase 2 implementation will benefit Snohomish County by reducing the long-term liability and maintenance costs of the dike. This is a potential solution to a long-standing problem faced by these property owners and Snohomish County.

REGULATIONS AND PERMITS

Any actions that involve dredging or filling of waters of the United States or waters of Washington State require authorization under Sections 401 and 404 of the Federal Clean Water Act (CWA). Further, such activities require authorization by County and City governments under the Shoreline Management Act, Critical Area Ordinances, and Grading Regulations.

Considering that the sole purpose of this project is for ecological enhancement and restoration, we anticipate that earthwork associated with the project may be authorized under a CWA Section 404 Nationwide Permit No. 27 for stream and wetland restoration activities. The Corps is responsible for Section 404 authorization, while the State of Washington is responsible for Section 401 and 402 authorizations.

Other state permit requirements for the proposed project will include the State Environmental Protection Act (SEPA) checklist, and the Hydraulic Project Approval (HPA). Skykomish Habitat Mitigation Bank plans to submit the State of Washington Joint Aquatic Resource Permits Application (JARPA) to apply for project authorization. The project sponsor will work with the Mitigation Bank Review Team (MBRT) and local regulators to assure that all permitting requirements are met prior to project initiation.

Water Rights Application

We anticipate no impacts to water rights resulting from the Skykomish Habitat Mitigation Bank. The water balance along the site consists of a shallow groundwater surface that is closely linked with the water surface elevation in the Skykomish River. Hyphoreic flow dominates the shallow subsurface in which we will excavate the new channels. Any groundwater that may be captured by the constructed channels will be only temporarily stored before moving back to the river through a surface water or groundwater connection. Accordingly, we have determined that a water right is not necessary for implementation of the Skykomish Habitat Mitigation Bank.

SERVICE AREA

The geographic extent within which the proposed bank can operate, i.e., the area within which credits from the bank are considered to provide adequate replacement of habitat area and functions that must be mitigated, is a crucial factor in determining the viability of the bank. The habitat area and functions in the bank must truly replace the area and functions lost at an impact site. In some cases, this replacement may not be with identical habitat functions for exactly the same mix of species as is present at the impacted site; this is seldom the case with any mitigation action. In fact, it is often argued that the functions provided at the mitigation bank site exceed those lost at the impacted site. The appropriate extent of the service area for a bank may vary depending on the nature of the impact being mitigated for and the type of function provided. We propose a two-tiered approach to defining the service area based on impact types and habitat functions.

The Snohomish Basin (WRIA 7) will be the Tier 1 service area for all impact types and habitat functions served by the proposed mitigation bank. Limiting the Tier 1 service area to WRIA 7 avoids complicated review and approval associated with cross-basin mitigation transfers. This focused service area balances geographic flexibility with the desire for proximity between impacts and mitigation. We anticipate the majority of mitigation transactions will be driven by impacts within the Tier 1 service area.

The Tier 2 service area will be used only in special circumstances to be evaluated on a case-by-case basis. The Tier 2 service area would include the Skagit, Stillaguamish, Snohomish, Lake Washington, and Green/Duwamish Basins, (WRIAs 3 through 9). Impact types proposed for the Tier 2 service area include the following:

- Linear projects that span multiple basins (e.g., transportation corridors, utility corridors, pipelines);
- Natural Resource Damages Assessments (NRDA) associated with actions governed by Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA);
- Mitigation associated with actions governed by Resource Conservation and Recovery Act (RCRA); and

- Enforcement actions.

In the following section, the appropriate service area for the Skykomish Habitat Mitigation Bank is described for each of the types of habitat functions for which the bank is designed to provide credits. Table 3 presents the proposed service areas for the Skykomish Habitat Mitigation Bank.

Anadromous Salmonid Habitat

The proposed Tier 1 service area for anadromous salmonid habitat credits from the Skykomish Habitat Mitigation Bank includes the Snohomish Basin (WRIA 7). Anadromous salmonids utilize a range of habitat types in different locations throughout the basin as these fish migrate and mature through sequential life-history phases. Habitat improvements at specific locations within a watershed create benefits that support fish that reside throughout the basin. We anticipate that the majority of mitigation transactions will apply to impacts that occur within the Tier-1 service area.

The proposed Tier 2 service area extends from the Skagit Watershed through the Green/Duwamish Watershed, and will apply to the special cases identified above on a case-by-case basis. Over the short-term time scale, the ecological connection between distinct salmon populations diminishes as those populations are located further apart from one another. Nevertheless, interactions and exchange between salmonid populations in neighboring basins exist and can play a key role in the long-term stability of the regional salmon population. The following explanation provides a brief basis for considering a service area larger than WRIA 7 for a limited set of special circumstances identified above.

A significant number of efforts are currently underway at several levels to analyze the causes of declines in salmon populations in Puget Sound during the last few decades of the last century and to develop restoration plans. At the local and regional level, those plans have focused on habitat degradation as a key to determining factors limiting anadromous run sizes and on habitat restoration as a means to restore viable salmon populations. Virtually all of these efforts (e.g., SBSRTC 2003) emphasize the need to take a broad perspective of the salmon recovery challenge. NOAA Fisheries, in its initial review of the status of chinook salmon (Myers et al. 1998), thoroughly analyzed factors such as geologic and glacial history, geographic and reproductive isolation, genetics, morphological characteristics, and dominant life history patterns to identify Puget Sound chinook salmon as a distinct population segment, representing an evolutionarily significant unit (ESU) of chinook salmon. NOAA Fisheries (pg. 3) defines an ESU as, "...a population that 1) is substantially reproductively isolated from conspecific populations and 2) represents an important component of the evolutionary legacy of the species." The ESU geographically extends from the Elwha River along the Strait of Juan de Fuca to the Nooksack River in the north and including the major rivers in Puget Sound and Hood Canal. Although, native runs to specific rivers maintain a degree of genetic isolation, NOAA Fisheries concluded there is a sufficient degree of interchange of fish among the rivers within the region to consider it an ESU. Under the ESA, NOAA Fisheries is charged with protection and recovery of chinook salmon on an ESU-wide basis and is establishing recovery goals accordingly.

On this basis, activities that benefit chinook salmon in the Snohomish River could be used to adequately offset impacts to chinook in another river system anywhere in the ESU. However, it may be hard to justify providing mitigation in the Snohomish system for impacts to streams in Hood Canal or the Straits. A reasonable argument can be made, however, for straying among the Skagit, Stillaguamish, Lake Washington, and Green/Duwamish systems (WRIAs 3 through 9). In its summary of chinook salmon biology, NOAA Fisheries (NMFS 1998) describes the straying of adult salmon between river systems as an important feature to maintain or restore runs in a system that experiences a severe habitat impact. For example, if Glacier Peak erupted and wiped out fish in the Sauk/Skagit or Stillaguamish drainages, straying of adults from the Snohomish would be a primary contributor to recovery of lost runs or year classes. Bull trout recently tagged (acoustic tags) in the Snohomish estuary have been recaptured in both the Stillaguamish and Skagit systems (J. Starkes, Pentec Environmental, personal communications) suggesting that bull trout in these three areas may represent a single population.

Resident Salmonid Habitat

Because resident fish, by definition, are confined to a relatively localized area, there is little basis for exchange of mitigation credits affecting only resident fish habitat outside of the Snohomish Basin. Therefore, it is proposed that the service area for resident fish habitat credits from the Skykomish Habitat Mitigation Bank include only the Tier 1 service area (WRIA 7). Replacement of lost resident fish habitat in the Snohomish Watershed with fish habitat in the mitigation bank would have the added benefit of providing habitat area for use by anadromous fish.

Riparian Zones

Riparian habitat provides a wide range of habitat benefits to adjacent wetlands or streams. City and county critical areas regulations (e.g., SCC 32.10) require maintenance of buffers of existing riparian area along streams and wetlands as a part of the protection of critical areas. When those buffers must be altered to allow reasonable use of a property, mitigation is required, usually in the form of improved or restored riparian conditions elsewhere in the jurisdiction. Because of the nature of riparian zone functions provided to streams (water quality moderation, shading, leaf and litter fall, LWD), there is a clear rationale for mitigating within the same river system. Increased shading in Monroe can offset thermal input to the river that is increased by lost vegetation in Sultan or Snohomish. LWD contribution to the Snohomish River and estuary lost in Fall City can be replaced by LWD from Monroe.

Therefore, it is proposed that mitigation for riparian area impact be limited to the Tier 1 service area (WRIA 7).

Wetlands

Wetlands, similar to resident fish, are confined to their defined location. However, wetland benefits to the watershed can extend for many miles downstream in the manner described above for riparian habitat. In particular, where wetlands are connected to surface waters, wetland functions of moderating hydrology and sequestering sediments and contaminants can benefit surface waters well downstream. Wetlands to be enhanced or restored in the Skykomish Habitat Mitigation Bank will be connected to the river and will provide function to lower areas in the basin. Thus, it is proposed that the service area for wetland impacts be limited to the Tier 1 service area (WRIA 7).

CREDIT DEVELOPMENT AND EXCHANGE

Establishing Baseline Habitat Function

To determine the “sellable” credits to be established by the Skykomish Habitat Mitigation Bank, it is first necessary to determine the baseline conditions of the site prior to bank development. The site currently has value associated with the existing stream channels, wetlands, and riparian zones. The current area of these existing habitat types is presented in Table 4 and shown on Figure 3.The existing habitat elements of the site will be evaluated and subtracted, or debited, from any enhancements that are made to the site; in this way, Skykomish Habitat, LLC will account for the existing “value” of the site and will account for the baseline value in its net credit calculation such that:

Total Number of Credits = (Ecological Lift -- Baseline Functional Value)

Baseline habitat area and condition will be determined through pre-construction habitat surveys, utilizing an agreed-upon methodology for each habitat type represented by the bank. We will conduct thorough surveys to determine the total area of the site that currently contains any of the habitat elements that will later be made available for mitigation: stream channels, wetlands, riparian areas, and forested uplands. The selected methodologies for the habitat assessment will be an important tool, as this methodology will not only establish the baseline area of each habitat type, but it will establish a baseline function level from which we will compare future function and judge our performance criteria. These criteria will become the basis for future monitoring and reporting on the bank's progress and will be included within the MAMP, as discussed below.

Credit Generation

We propose a 1:1 credit development strategy for restored areas; simply, we will generate for sale one credit for each acre of habitat that we restore. For enhanced areas (areas that currently support wetland, stream channel, or riparian habitat that will be enhanced through the restoration of adjacent areas) we propose a credit development ratio of 1:2. According to the Washington State Department of Ecology's draft wetland mitigation bank rule, Chapter 173-7–354 WAC, Ecology suggests a range of 1:2 to 1:6 for credit conversion in enhanced areas. We feel that this project, with its ecologic mosaic of stream channel, side channels, riparian areas, and riverine wetlands constitutes a significant ecological lift to existing habitat areas, and thus justifies the 1:2 credit establishment.

Our credit strategy will greatly facilitate the utility of the bank for end-users, who will typically be required to mitigate for environmental impacts based on an acreage equation determined by the lead agency. In each phase, we will restore and enhance both stream channel and wetland habitats, along with adjacent riparian zones and upland buffers. Based on our design drawings (Figures 4 and 5), we have calculated the acreage of each habitat element that we plan to restore and enhance during each project phase. The results are presented in Table 4. Based on these areas, we have developed a credit generation table (Table 5) that fully defines the manner in which credits will be calculated and allocated to end-users for each phase of the Skykomish Habitat Mitigation Bank. The final credit calculations will be determined prior to approval of the Mitigation Banking Instrument (MBI) and will be based on final design drawings.

Given that the type of habitat we propose to restore requires a dynamic interaction between river, side channels, eroding banks, and riverine wetlands, establishing static credit values for each habitat type is challenging. The final product of the mitigation bank is a site where the river freely moves from the mainstem Skykomish River, through a dynamic side channel complex, and into floodplain wetlands, all the while carving out complex niches of side channels and pool habitat that will provide critical off-channel refugia for juvenile and rearing salmonids. To achieve this level of habitat, we propose a controlled return to natural processes over two phases, each with specific performance criteria that will be closely monitored.

It may be that as the project matures, the exact ratio of stream channel area to riparian zones to adjacent wetlands may change, in either direction. However, it is this adjustment over time, and the habitat complexity that it creates, that is the ultimate goal of the mitigation bank. Thus, we propose at this point to establish credits according to the design plans, understanding that establishing a fixed area for each habitat type is not the target, but rather the habitat goals of the project. Credits are determined for each habitat type based on the design plans (Figures 4 and 5), and coupled together to form one "universal" credit that reflects the true nature of the project design, and the project benefits. Table 5 demonstrates the credit valuation for each project phase, and how we combine differing habitat acreage into one, universal credit total for each phase.

In this manner, the use of a credit reflects the true value of the quality of the mitigation used to offset the impact. This allows for a more integrated and holistic view of the credit determination process and allows credits to be universally exchanged, truly reflecting the habitat benefits of the Skykomish Habitat Mitigation Bank.

Performance Criteria and Habitat Assessment Methodologies

Performance criteria will be established for the project. Proof of achieving these performance criteria will dictate the release of credits and provides assurances to regulators and bank end-users that the habitat objectives of the project will be met, and thus the long-term ecological replacement value of the bank. Performance criteria will be established by the chosen functional assessment method.

We have evaluated several functional assessment methods that could be used to determine the success of our restoration efforts. Unfortunately, there is no one method or matrix that adequately assesses the varying habitat types with one, holistic approach. The multi-habitat nature of the project provides a challenge for utilizing any one existing functional assessment methodology. Therefore, we feel it most appropriate and technically sound to choose those methods that are most commonly used, and those which best characterize each habitat type individually; wetlands, stream channels, riparian zones, and forested upland areas. Each of these assessments will be completed prior to signing the MBI to firmly establish baseline conditions, then again at various intervals throughout each phase of the project, as determined by the MAMP, to assure that performance criteria are being met throughout the life of the bank.

We will assess wetland function with the new Western Washington Wetland Rating System, developed by Tom Hruby at the Washington State Department of Ecology. This is now recognized as the "standard" for wetland function evaluation in Western Washington. For stream channel areas and riparian zones, we will use one of the Properly Functioning Condition (PFC) matrices, developed by NOAA Fisheries and the U.S. Forest Service. The PFC method relies on physical indicators of functional habitat; this will be very effective in assessing the evolution of habitat improvement over time, as stream channels develop and begin to demonstrate greater presence of those key physical properties, such as wood, shade, and cover, which we understand to create the most valuable aquatic habitat. For upland areas, we have yet to determine the most appropriate functional index

Mitigation Replacement Ratios

The multiple habitat elements to be restored through the Skykomish Habitat Mitigation Bank will allow for a variety of users to utilize the bank for mitigation. In the Credit Generation Methodology, we propose to evaluate and rate each habitat type separately, then combine the credits for each element to create one unit of credits that can be made available to end-users, in acres.

Considering the dynamic nature of the restoration design, we feel this is more appropriate than parceling the separate habitat types and assuring static conditions for each phase. Over time, the site will provide a natural progression of side channel formation that will migrate between mature riparian areas and riverine wetlands, providing the maximum habitat, flood conveyance, and water quality benefits that this site can offer.

For the bank end-user, however, it will be necessary to match their impact with the most appropriate ratio of credits (acres) from the Skykomish Habitat Mitigation Bank. Accordingly, the MBI will contain a table of ratios that represents the full range of potential impact types, and the proposed ratio that the bank will provide to fully mitigate those impact types. We present Table 6 to serve as an example that reflects the present ratios that are typically considered during negotiations between agencies and applicants

A key advantage to this approach is in encouraging ease of use among the regulatory community in determining the appropriate number of mitigation credits required to satisfy a permit condition through use of a familiar framework.

Skykomish Mitigation Banking End-User Example

To facilitate a greater understanding of the Skykomish Habitat Mitigation Bank, we provide an example of how an end-user within the designated Service Area may utilize the bank to offset an authorized impact.

A developer in an area of the designated Service Area wishes to fill 1 acre of a Category II palustrine wetland to build a mini-mall. Based on a functional analysis of the wetland area that will be impacted, the lead regulatory agency approves the impact with the mitigation requirements being 1.5:1 for on-site mitigation, or 3: 1 for off-site mitigation.

Since there is no additional area on the property for on-site mitigation, the developer chooses to mitigate his impact off site. After reviewing options for off-site mitigation, including the costs of property acquisition, maintenance, and monitoring, the developer chooses to use the Skykomish Habitat Mitigation Bank.

Based on the suggested replacement ratios for the Skykomish Habitat Mitigation Bank shown in Table 6, the developer would have to replace Category II wetlands at a 2.5:1 ratio. However, the developer will be subject to a determination made by the lead agency on the total number of credits required to satisfy the mitigation requirement. The regulatory agency reviews the suggested replacement guidelines (Table 6), and the permit requirements and determines that the developer will need to purchase 3 credits (acres) from the bank to satisfy the off-site mitigation requirements for his 1-acre wetland impact.

The developer purchases 3 credits from the approved Skykomish Habitat Mitigation Bank. Skykomish Habitat provides notification to the lead regulatory agency that the credits have been purchased, debited from the bank, and appropriately recorded as per the requirements of the MBI. The developer has therefore satisfied its mitigation requirement and is free to go ahead with its authorized impact. The maintenance and monitoring requirements of the mitigation action have been assumed by the mitigation bank as provided for in the MBI and the MAMP, as established and approved during the MBRT process.

Credit Release Schedule

To provide for the most effective management of credit inventories, and given the fact the project will be implemented in two phases, Skykomish Habitat proposes to establish two separate credit release schedules that directly relate to each of the phased areas. Each credit schedule will be implemented at the time construction begins on a given phase. Specific performance standards will be established upon approval of design. These standards will be met and documented to release credits based on the schedule below. The following outline details the proposed credit release schedule for each phase of the project:

- Ten percent of the anticipated number of credits per phase will be released upon Skykomish Habitat meeting the following conditions:
    - Mitigation Banking Instrument signed by all required agencies;
    - Financial assurances are in place; and
    - All required permits for construction have been received.

- Thirty percent of the anticipated number of credits per phase will be released upon submission of an as-built survey, MBRT review, inspection, and approval of the as-built condition approval, and inspection of the property within 45 days after the as-built survey is received by MBRT members.

- Ten percent of the anticipated number of credits per phase will be released upon demonstration that hydrologic conditions have been met in accordance with approved performance standards.

- Ten percent of the anticipated number of credits per phase will be released upon demonstration that bank performance standards as defined in the Mitigation Banking Instrument have been met for 1 year.

- Ten percent of the anticipated number of credits per phase will be released upon demonstration that bank performance standards as defined in the Mitigation Banking Instrument have been met for 2 years.

- Ten percent of the anticipated number of credits per phase will be released upon demonstration that bank performance standards as defined in the Mitigation Banking Instrument have been met for 3 years.

- Ten percent of the anticipated number of credits per phase will be released upon demonstration that bank performance standards as defined in the Mitigation Banking Instrument have been met for 4 years.

- The final ten percent of the anticipated number of credits per phase will be released upon demonstration that bank performance standards as defined in the Mitigation Banking Instrument have been met for 5 years.

In the event that performance standards are not met, the MBRT may delay the release of credits from the bank at the appropriate milestone until performance standards are met. However, the MBRT may not suspend the sale of credits that have already been released unless Skykomish Habitat, LLC has caused a material breach of the conditions of the MBI. For example, if Skykomish Habitat, LLC has completed its construction, and demonstrated hydrology and has achieved a fifty percent release of credits, but fails to meet performance standards after 1 year (e.g., lack of plant survival due to drought conditions), Skykomish Habitat, LLC will simply not receive the appropriate 10 percent release of credits for this project milestone until performance standards have been met at that project milestone.

A comprehensive list of such performance standards and project milestones for each phase will be agreed upon during the MBRT process, and incorporated into the MBI. The list of performance standards will serve as specific requirements for project performance and credit release. Additionally, other conditions that would constitute proper grounds for suspending credit sales will be clearly defined and incorporated into the MBI. These conditions would allow the MBRT to suspend credit sales if they were violated or breached by Skykomish Habitat, LLC.

MONITORING AND REPORTING

Skykomish Habitat, LLC shall monitor and report to the MBRT on the progress of the bank toward achieving its goals and objectives. Monitoring criteria will be established with the consensus of the MBRT, as well as methodologies and sampling intervals. These monitoring criteria will be incorporated into a document that is included by reference in the MBI.

A MAMP will define monitoring criteria that will be used to verify that the habitat function goals of the project are being met, and provide for corrective measures to make the necessary adjustments if it is not. Monitoring activities contained in the MAMP may include measurements and observations of site hydrology, channel evolution, slope, cross section shape, plant survival, species composition, LWD recruitment and placement, and other features that define quality stream and wetland habitat. Additionally, we may duplicate the functional assessment methodologies at various stages in the project life. (See also: Long-Term Protection and Adaptive Maintenance Plan section below for further discussion of the MAMP).

Skykomish Habitat, LLC is committed to creating the highest quality habitat that the site potentially has to offer, and we have employed local experts who have the skills and the experience to judge whether we have. If necessary, we will continually add value to the project to meet all of our ecological objectives.

A more fully developed monitoring plan and guidelines will be developed upon project permitting.

FINANCIAL ASSURANCES

Preliminary budget estimates for the construction of the mitigation bank are approximately $4 million. The maintenance and monitoring and adaptive management contingency budget is estimated to be approximately $800,000. Skykomish Habitat, LLC's members—Academy Holdings, LLC and Environmental Restoration, LLC—have the necessary resources to ensure that the project is able to be completed. Academy Holdings, LLC has already acquired the property, and Environmental Restoration, LLC is a fully funded company specializing in the production and administration of mitigation banks.

Skykomish Habitat, LLC proposes to post two security instruments, per phase, to insure the project. The first instrument will be a performance bond guaranteeing construction of a given phase will be completed, as per the requirements of the MBI. This bond will cover the cost of construction of a particular phase of the project and include a contingency factor to ensure that any changes that may be required during construction are fully secured.

The second instrument will be a maintenance and monitoring bond that will guarantee the cost within a given project phase of conducting the monitoring program and any activity under the MAMP, which will include any corrective construction measures that may be required to ensure the long-term success and stability of the phased area/site. An approved monitoring and reporting plan and MAMP will be more fully developed based on final design specifications and specific performance standards for each project phase will be reflected in the MBI. The term of this bond will be 5 years after the completion of construction, the maintenance and monitoring period.

Skykomish Habitat, LLC proposes to establish an endowment fund by contributing an amount from each credit sold into an endowment fund that will transfer to the ultimate donee to provide for long-term management at the conclusion of the mitigation banking program. At the conclusion of the mitigation banking program (i.e., after all remaining credits from the bank have been transferred), the bank site will be donated to an appropriate and qualified non-profit third party for long-term maintenance and permanent protection. To date, Skykomish Habitat, LLC has identified multiple potential donee candidates, and has received informal expressions of interest from several potential donees who are interested in receiving the property at the conclusion of the banking program. While no decision has been made yet on which entity will receive the property, Skykomish Habitat, LLC will carefully evaluate these candidates and will donate the property to an entity that is fully capable of adequately providing for permanent protection and management in perpetuity.

LONG-TERM PROTECTION AND ADAPTIVE MANAGEMENT PLAN

At the time Skykomish Habitat, LLC has received all required signatures on the MBI, obtained all permits necessary to perform construction, and posted the agreed upon financial assurances, Skykomish Habitat proposes to perform a Boundary Line Adjustment to consolidate lots into the project phase areas. A Conservation Easement for each phase will be recorded with Snohomish County prior to a given phase's construction, which will provide permanent protection of the constructed project areas in perpetuity as a restored salmonid and wetland habitat mitigation site. This will allow the owner the ability to continue to conduct its existing on-site operations during the initial phase provided that such activities do not interfere, or adversely affect the phase under construction and/or previously constructed phase. Provisions will be added to the Conservation Easement that will allow Skykomish Habitat, LLC to implement the approved construction activities, adaptive management, and long-term management related to the mitigation-banking project, as provided by the MBI.

Skykomish Habitat, LLC will develop a MAMP for the Skykomish Habitat Mitigation Bank that will provide guidance and criteria for the future management of the project site, which will be reflected in the MBI. The MAMP will define the monitoring parameters that will be used to measure the project's success. The MAMP will also direct additional corrective procedures, if needed, to address any area of the site that may fail to meet project goals. Project criteria, design process, and construction guidelines will be outlined in the MAMP to assure that clear instruction is provided for adaptive management of the site. A preliminary cost estimate for conducting activities under the MAMP is contained in the previous Financial Assurances section of this prospectus.

The MAMP will be developed in cooperation with the MBRT based on the functional parameters identified that are needed to support successful achievement of the Mitigation Bank's goals and mitigation credit criteria. However, considering the desired outcome of the project design is to create a dynamic system, which mimics the natural landscape processes of a constantly shifting braided riverine environment and the habitat benefits associated with such a system, Skykomish Habitat, LLC will require a certain amount of latitude in establishing benchmarks for project success. The success of the proposed design relies on the dynamic relationship between the mainstem Skykomish River, side channel zones, and riverine wetlands that will be created as part of this project. The multitude of habitat, water quality, and flood conveyance benefits that will result from this project requires the variability and complexity than can only be created by the forces of nature. We propose to implement controlled modifications to the current controls on the river at the project site to promote restoration by creating an environment in which the river will be allowed to freely migrate and find its own course within the channel migration zone. This type of design, while providing the maximum potential benefits from this property does not afford the opportunity to rely on a static condition to measure project success. We anticipate immediate benefits from the project, but we also realize that the greatest benefits of all will be realized well into the future as these natural processes continue to evolve. The MAMP will be created to reflect this understanding.

Despite the intended dynamic nature of the proposed design, the design team will identify tolerance thresholds for key project elements that must be functioning properly for these natural processes to continue to occur. It is the proper function of these elements that will form the basis for measuring project success.

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TABLES

Table 1 - Skykomish Habitat Mitigation Bank, Calculated Recurrence Intervals and Water Surface Elevations

Recurrence Interval	Discharge in cfs	Water Surface Elevation in Feet		
		FEMA	FEQ	HEC-RAS
2-Year	43,000	N/A	N/A	37.4
10-Year	98,000	43.0	N/A	42.3
50-Year	140,600	45.5	N/A	44.9
100-Year	160,800	46.6	47.5	46.1

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Table 2 – Skykomish Habitat Mitigation Bank, Proposed Planting List

Upland Areas

Scientific Name	Common Name	Relative Abundance per Plant Type in %	Size	Notes
TREES				
Acer macrophyllum	Big leaf maple	20	Bare root or 1 gallon	Plant in groups with other hardwoods 8 to 15 feet o.c.
Alnus rubra	Red alder	10		Plant in groups with other hardwoods 8 to 15 feet o.c.
Populus balsamifera ssp. *trichocarpa*	Black cottonwood	10		Plant in groups with other hardwoods 8 to 15 feet o.c.
Prunus emarginata	Bitter cherry	5		Plant in groups with other hardwoods 8 to 15 feet o.c.
Pseudotsuga menziesii	Douglas fir	17		Intersperse 1 to 3 plants within groups of hardwoods.
Rhamnus purshiana	Cascara	4		Plant in groups with other hardwoods 8 to 15 feet o.c.
Thuja plicata	Western red cedar	17		Plant in groups with other conifers 8 to 20 feet o.c.
Tsuga heterophylla	Western hemlock	17		Plant in groups with other conifers 8 to 20 feet o.c.
SHRUBS				
Acer circinatum	Vine maple	5		
Amelanchier alnifolia	Serviceberry	5		
Berberis aquifolium	Tall Oregon grape	5		
Berberis nervosa	Oregon grape	10		
Corylus cornuta	Hazelnut	5		
Gaultheria shallon	Salal	10		
Holodiscus discolor	Ocean spray	5		
Oemleria cerasiformis	Indian plum	10		
Ribes sanguineum	Red-flowering currant	1		
Rosa gymnocarpa	Wood rose	5		
Rosa nutkana	Nootka rose	5		

Table 2 – Skykomish Habitat Mitigation Bank, Proposed Planting List

Upland Areas (Continued)

Scientific Name	Common Name	Relative Abundance per Plant Type in %	Size	Notes
SHRUBS (Continued)				
Rubus parviflorus	Thimbleberry	5		
Rubus spectabilis	Salmonberry	10	3 to 4 ft. cuttings or whips	Plant in clusters of 3 to 5 whips near and just above the OHWM 5 to 10 feet o.c.
Salix scouleriana	Scouler's willow	10	2 to 3 ft stakes	Plant live stakes in groups of 3 to 5 just upslope of Sitka willow. Intersperse and offset between clusters of Sitka willow stakes.
Sambucus racemosa	Red elderberry	1		
Sorbus sitchensis	Mountain ash	1		
Symphoricarpos albus	Snowberry	5	1 gallon	Plant within a band between the top of bank and about 8 feet downslope.
Vaccinium ovatum	Evergreen huckleberry	1		
Vaccinium parviflorum	Red huckleberry	1		

Wetlands

Scientific Name	Common Name	Relative Abundance per Plant Type in %	Size	Notes
TREES				
Alnus rubra	Red alder	5		Plant in groups with other hardwoods 8 to 15 feet o.c.
Betula papyrifera	Paper birch	5		
Picea sitchensis	Sitka spruce	25		Plant in groups with other conifers 8 to 20 feet o.c.
Populus balsamifera ssp. *trichocarpa*	Black cottonwood	30		Plant in groups with other hardwoods 8 to 15 feet o.c.
Salix lasiandra var.	Pacific willow	10		
Thuja plicata	Western red cedar	25		Plant in groups with other conifers 8 to 20 feet o.c.

Wetlands (Continued)

Scientific Name	Common Name	Relative Abundance per Plant Type in %	Size	Notes
SHRUBS				
Cornus stolonifera	Red-osier dogwood	15	2 to 3 ft stakes	Plant live stakes in groups of 3 to 5 at or just above the OHWM. Intersperse between clusters of Scouler's wilow stakes.
Crataegus douglasii	Douglas' hawthorn	5	1 gallon	Plant together with western crabapple in groups; space plants 5 to 8 feet o.c.
Lonicera involucrata	Black twinberry	10		
Malus fusca	Western crabapple	5	1 gallon	Plant together with Douglas' hawthorn in groups; space plants 5 to 8 feet o.c.
Ribes lacustre	Prickly currant	5		
Rosa pisocarpa	Clustered rose	10		
Rubus spectabilis	Salmonberry	15	3 to 4 ft. cuttings or whips	Plant in clusters of 3 to 5 whips near and just above the OHWM 5 to 10 feet o.c.
Salix scouleriana	Scouler's willow	15	2 to 3 ft stakes	Plant live stakes in groups of 3 to 5 just upslope of Sitka willow. Intersperse and offset between clusters of Sitka willow stakes.
Salix sitchensis	Sitka willow	20	2 to 3 ft stakes	Plant live stakes in groups of 3 to 5 at or just above the OHWM. Intersperse between clusters of Scouler's wilow stakes.

Table 2 – Skykomish Habitat Mitigation Bank, Proposed Planting List

Wetlands (Continued)

Scientific Name	Common Name	Relative Abundance per Plant Type in %	Size	Notes
HERBS AND GROUNDCOVERS				
Scirpus microcarpus	Small-fuited bullrush			
Scirpus americanus	Three-square bulrush			
Juncus ensifolius	Dagger leaf rush			
Eleocharis palustris	Creeping spikerush			
Carex utriculata	Beaked sedge			
Carex stipata	Sawbeak sedge			
Carex obnupta	Slough sedge			
Carex lyngbyei	Lyngby sedge			

Riparian Areas

Scientific Name	Common Name	Relative Abundance per Plant Type in %	Size	Notes
TREES				
Alnus rubra	Red alder	20	1 gallon	Plant in groups with other hardwoods 8 to 15 feet o.c.
Betula papyrifera	Paper birch	5		
Populus balsamifera ssp. *trichocarpa*	Black cottonwood	35	1 gallon	Plant in groups with other hardwoods 8 to 15 feet o.c.
Salix lasiandra var.	Pacific willow	10		
Thuja plicata	Western red cedar	30	1 gallon	Plant in groups with other conifers 8 to 20 feet o.c.

Riparian Areas (Continued)

Scientific Name	Common Name	Relative Abundance per Plant Type in %	Size	Notes
SHRUBS				
Alnus rubra	Red alder	20	1 gallon	Plant in groups with other hardwoods 8 to 15 feet o.c.
Cornus stolonifera	Red-osier dogwood	25	2 to 3 ft stakes	Plant live stakes in groups of 3 to 5 at or just above the OHWM. Intersperse between clusters of Scouler's wilow stakes.
Lonicera involucrata	Black twinberry	10		
Physocarpus capitatus	Pacific ninebark	10	1 gallon	Intersperse 2 to 3 plants in groups between groups of salmonberry whips; space plants 3 to 6 feet o.c.
Salix scouleriana	Scouler's willow	30	2 to 3 ft stakes	Plant live stakes in groups of 3 to 5 just upslope of Sitka willow. Intersperse and offset between clusters of Sitka willow stakes.
Salix sitchensis	Sitka willow	25		

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Table 3 - Skykomish Habitat Mitigation Bank, Proposed Service Areas

Proposed Service Area	Tier 1 Service Area WRIA 7	Tier 2 Service Area WRIAs 3, 5, 7, 9, 10
Authorized Impact Type		
Anadromous Salmonid Habitat	X	X
Resident Salmonid Habitat	X	
Riparian Buffer	X	
Wetlands	X	
Upland Buffer	X	

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Table 4 - Skykomish Habitat Mitigation Bank, Total Habitat Restoration for Each Project Phase

Phase	Existing Conditions Acreage	Phase 1 Acreage	Phase 2 Acreage	Total Acreage
Habitat Type				
Stream Channels	3	13	30	46
Riparian Buffer	23	2	25	49
Wetlands	21	65	44	129
Enhanced Uplands	0	14	0	14
Total Habitat Acreage Phase Gain	47	93	99	239

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Acreage determined from Conceptual Design Drawings (Figures 3, 4, and 5)

Table 5 - Skykomish Habitat Mitigation Bank, Credit Calculation for Each Phase

Pre-construction Existing Area	Phase 1 Area in Acres	Phase 2 Area in Acres	Total Existing Area in Acres
Habitat Type:			
Stream Channel	3	0	3
Riparian Buffer	23	0	23
Wetlands	19	2	21
Uplands	0	0	0
Subtotal (Functioning Acres)	45	2	47
Non-Functioning Acres*	93	99	192
TOTAL	**138**	**101**	**239**

Phase 1	Existing Area in Acres	Enhancement Ratio	Number of Enhancement Credits	Restoration Area in Acres	Restoration Ratio	Number of Restoration Credits	Total Improved Area in Acres	Total Number of Credits
Habitat Type:		1 : 2			1 : 1			
Stream Channel	3	0.50	1.5	13	1.00	13	16.0	14.5
Riparian Buffer	23	0.50	11.5	2	1.00	2	25.0	13.5
Wetlands	19	0.50	9.5	64	1.00	64	83.0	73.5
Uplands	0	0.50	0.0	14	1.00	14	14.0	14.0
Subtotal Enhancement	45	0.50	22.5	n/a	n/a	n/a	138.0	115.5
Non-Functioning Acres*	93.0	n/a	n/a	n/a	n/a	93	0.0	n/a
TOTAL	**183**			**93**			**138.0**	**115.5**

Phase 2	Existing Area in Acres	Enhancement Ratio	Number of Enhancement Credits	Restoration Area in Acres	Restoration Ratio	Number of Restoration Credits	Total Improved Area in Acres	Total Number of Credits
Habitat Type:		1 : 2			1 : 1			
Stream Channel	0	0.5	0	30	1	30	30	30
Riparian Buffer	0	0.5	0	25	1	25	25	25
Wetlands	2	0.5	1	44	1	44	46	45
Uplands	0	0.5	0	0	1	0	0	0
Subtotal (Functioning Acres)	2	0.5	1	n/a	n/a	n/a	101	100
Non-Functioning Acres*	99	n/a	n/a	n/a	n/a	99	0	n/a
TOTAL	**103**		**2**	**99**		**198**	**101**	**100**

Post-construction Total Improved Area (Acres)	Phase 1 Area in Acres	Phase 2 Area in Acres	Total Area in Acres	Phase 1 Credits	Phase 2 Credits	TOTAL Credits
Stream Channel	16.0	30.0	46.0	14.5	30.0	44.5
Riparian Buffer	25.0	25.0	50.0	13.5	25.0	38.5
Wetlands	83.0	46.0	129.0	73.5	45.0	118.5
Uplands	14.0	0.0	14.0	14.0	0.0	14.0
Non-Functioning*	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	**138.0**	**101.0**	**239.0**	**115.5**	**100.0**	**215.5**

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[a] Habitat areas are based on the existing and preliminary design photos (Figures 3, 4, and 5). The final areas and credit calculations will be based on the acreage determined from the final design sheets.

[b] See Prospectus at p. (needs to be filled in once editing is complete-ask JMA) for Definition of Non-functioning Area - Non-functioning areas are Restored Areas through construction process

Table 6 - Skykomish Habitat Mitigation Bank, Credit Ratio Table Guidelines

				Skykomish Habitat Bank Credits
Authorized impact by aquatic resource quality-type category	Wetland	Low	(Category 4 wetland)	1.5:1
		Medium	(Category 2 and 3 wetlands)	2.5:1
		High	(Category 1 wetland)	4:1
	Stream	Low	(Stream Types 4 and 5/Resident Salmonid Habitat)	3:1
		Medium	(Stream Type 3)	4:1
		High	(Stream Types 1 and 2)	5:1
	Riparian Buffer	Low		1.5:1
		Medium		2:1
		High		3:1
	Upland Buffer			2:1
	Open water		(lakes, ponds, impoundments)	2:1

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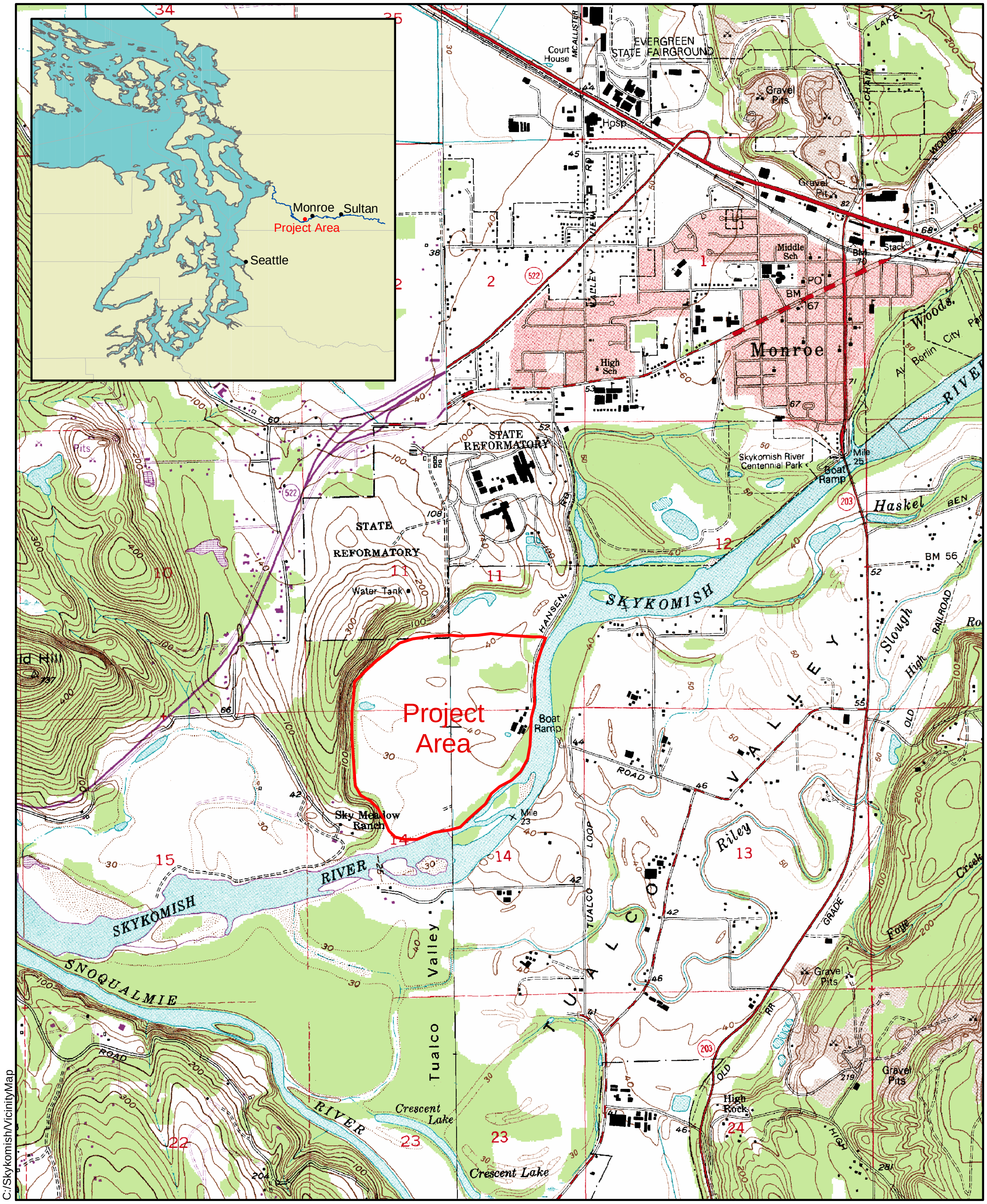
1 These ratios present a starting-point for mitigation requirements. Regulatory agencies reserve the right to adjust these ratios on a case-by-case basic to ensure that authorized aquatic resource impacts are adequately compensated for by the purchase of bank credits. For example, a ratio may be reduced to account for any project-specific compensatory mitigation implemented on site. In other cases, a ratio might be increased to provide additional compensatory mitigation necessary to resolve an enforcement action.

2 Wetland category types are from "Washington State Wetlands Rating System, Western Washington" (2nd edition, August 1993, Ecology Publication #93-74). Stream types are from WAC 222-16-030 and 222-16-031.

3 The normal ratios may be reduced by one-third (e.g., 1.5:1 to 1:1) for those credits that remain unsold 5 full years after they were released for sale.

FIGURES

Vicinity Map



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N

0 250 500 1,000 1,500 2,000 2,500 Feet

Note: Map created from USGS topo

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Figure 1

Typical Site Cross Section

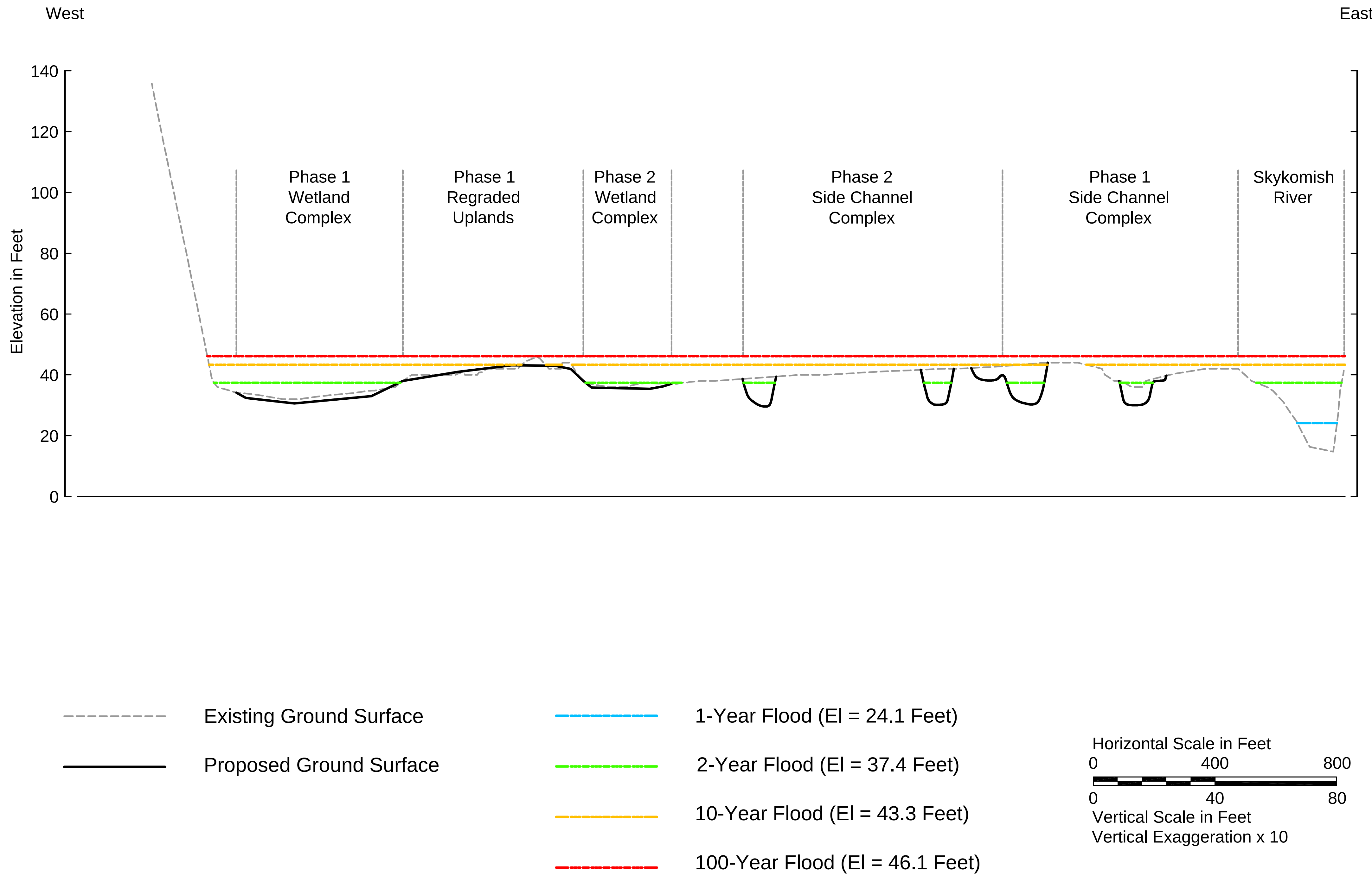

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Figure 2

Existing Land Cover

Skykomish Habitat Mitigation Bank

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Area

No Function (NF)	191.5 ac
Wetlands (W)	20.8 ac
Riparian Zone (RIP)	22.8 ac
Stream Channel (SC)	2.9 ac
Total	238 ac

Feet
0 125 250 500 750 1,000

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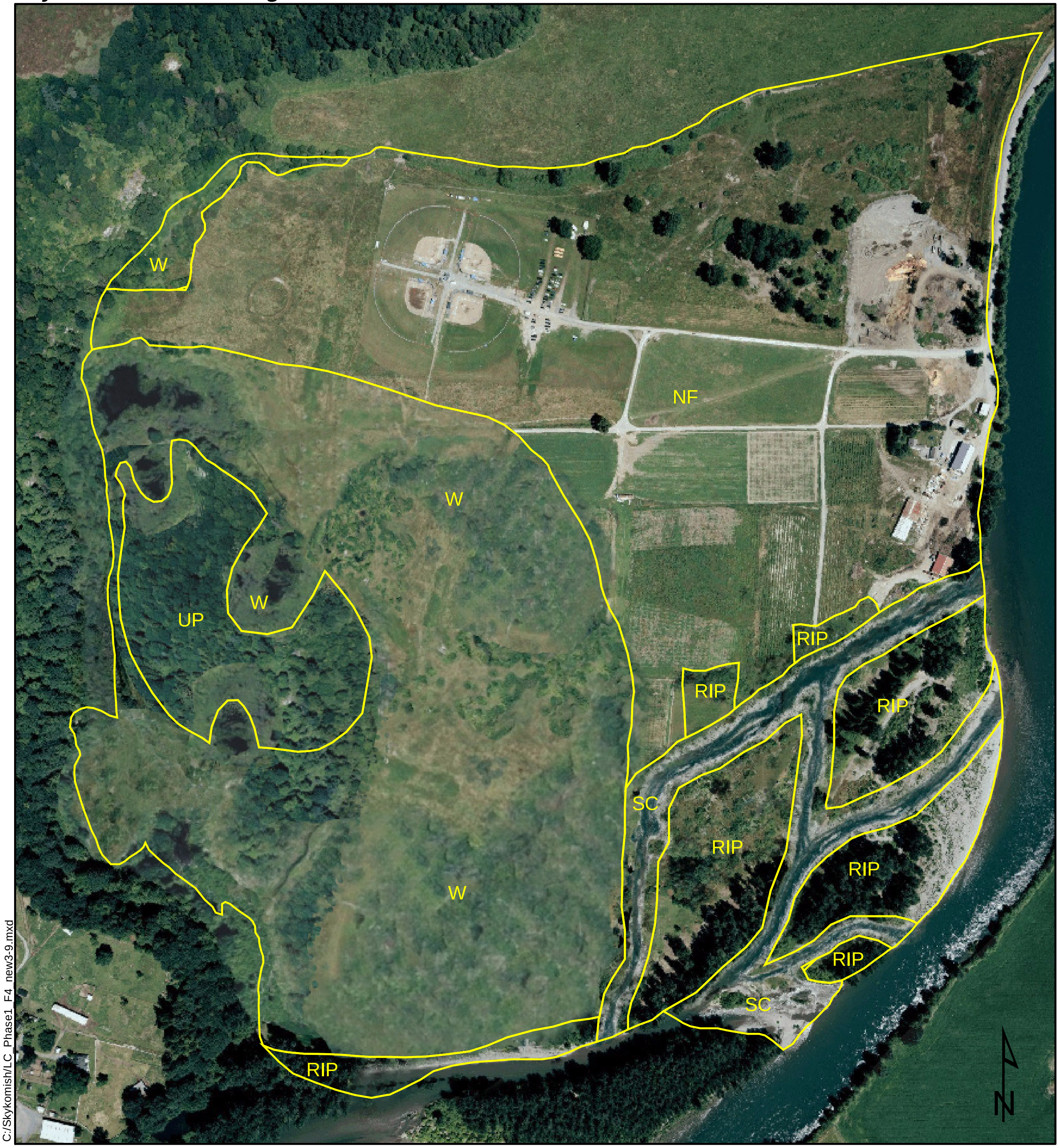
12597-07 ***04/04***

Figure 3

Phase 1 Land Cover

Skykomish Habitat Mitigation Bank



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Area

No Function (NF)	99.0 ac
Wetlands (W)	84.5 ac
Riparian Zone (RIP)	24.8 ac
Stream Channel (SC)	16.1 ac
Upland (UP)	13.6 ac
Total	238 ac

0 125 250 500 750 1,000 Feet

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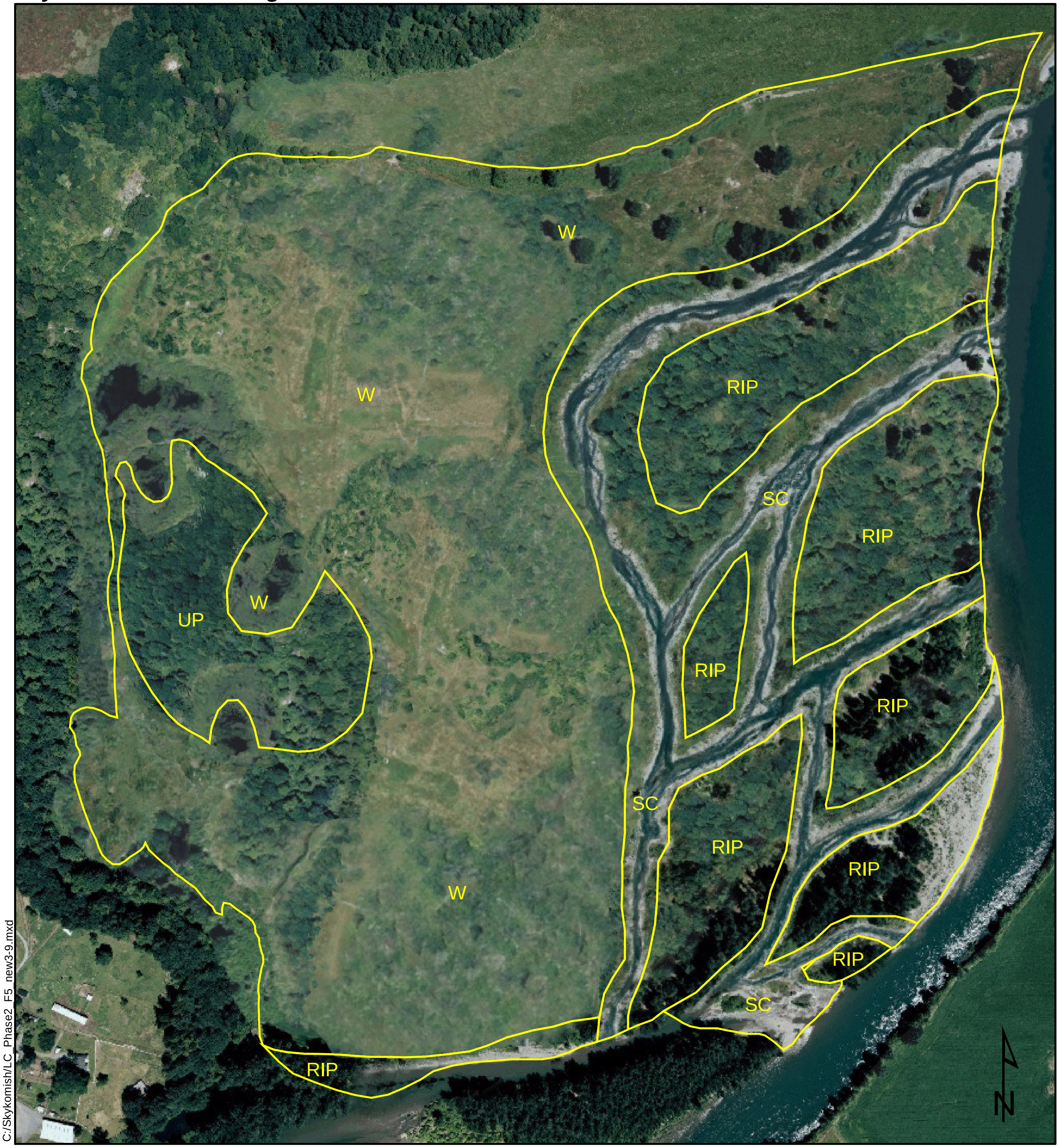
Figure 4

Phase 2 Land Cover

Skykomish Habitat Mitigation Bank



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Area

Wetlands (W)	128.7 ac
Riparian Zone (RIP)	49.7 ac
Stream Channel (SC)	46.0 ac
Upland (UP)	13.6 ac
Total	238 ac

Feet
0 125 250 500 750 1,000

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Figure 5